

SYSTEM PRACTICE 01333 IMG

EK-824/1232/1648

Electronic Key Telephone System For Software Version 3.0

Issue 1-1 October 16, 1985

*This manual should be read in its entirety before
attempting to install or program the system.*

This manual has been developed by TIEcommunications, Inc. It is intended for the use of its customers and service personnel.

Any comments or suggestions for improving this manual would be appreciated. Forward your remarks to:

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EK-824/1232/1648

REVISION CONTROL

REVISION	DATE	CHANGE
1-0	22 APR 85	Includes information on the EK-824, EK-1232 and EK-1648 systems using V3.0 software.
1-1	16 OCT 85	Reference to J21 on Page 5-9 was changed to J13.

EK-824/1232/1648
ELECTRONIC KEY TELEPHONE SYSTEM
INTRODUCTION

Section 1. **SYSTEM DESCRIPTION**, introduces the reader to the system. Section 1 contains general descriptive information about the system components, and details the telephone company, site and FCC requirements. It also includes a specification table.

Section 2. **FEATURES**, provides a detailed description of every feature available in the system. Additional data on key callouts, flash and signaling patterns, and display messages is also included.

Section 3. **HARDWARE CONFIGURATION**, allows the reader to develop the Order Sheet. The Order Sheet is used to record the equipment (hardware) requirements of the installation site.

Section 4. **SOFTWARE CONFIGURATION**, consists of the instructions necessary to configure the system programmable options. The data base developed in this section is entered on the Program Record Forms. The codes on the Program Record Forms are entered into system memory during installation.

Section 5. **INSTALLATION**, includes all the information required to successfully install the system.

Section 6. **INSTALLATION OF OPTIONAL EQUIPMENT**, contains description and installation data on each piece of optional equipment that can be used with the system.

Section 7. **PROGRAM ENTRY**, tells the reader how to enter the data base recorded on the Program Record Forms into system memory. All systems must be programmed to some degree before being operational.

Section 8. **THEORY OF OPERATION**, consists of the system and Printed Circuit Board (PCB) theory of operation for the system. This section is intended to be used with Section 9. **MAINTENANCE**, to allow service personnel to isolate system faults to the plug-replaceable unit.

Section 9. **MAINTENANCE**, is the final section of the manual and provides maintenance instructions for the system. The System Troubleshooting Flowchart, Operational Test Procedure, System Voltages table and the Replaceable Parts list are included in this section.

Appendixes A through E contain Operational Specifications (i.e., user instructions) for each telephone type.

Appendix F consists of the Off Premises Extension Description and Installation Manual.

EK-824/1232/1648
ELECTRONIC KEY TELEPHONE SYSTEM
SECTION 1, SYSTEM DESCRIPTION

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1. INTRODUCTION

1.01 The SYSTEM DESCRIPTION Section provides basic information about the EK-824/1232/1648 Electronic Key Telephone System. It summarizes the various components of the system, available station instruments, specifications, site requirements and Federal Communications Commission (FCC)/telephone company requirements.

1.02 Following is a list of related system documents:

Description	Part Number
Attendant Telephone User Guide	01333 AC
Multibutton Key Telephone User Guide	01333 MB
Four Button Key Telephone User Guide	01333 FB
One Button Single Line Telephone User Guide	01333 OB
Single Line (2500 Type) Telephone User Guide	01333 SL
Special Loud Ringing Tone Board Instructions	01042
TIE Electronic Ringer Instructions	01084
TELE-RECORD Description/Operation Manual	01026

2. SYSTEM DESCRIPTION

2.01 The EK-824, EK-1232 and EK-1648 comprise a sophisticated and flexible family of key telephone systems featuring modular design, fully interchangeable components and microprocessor control. Modular design allows these systems to be customized to meet a customer's needs, and then expanded if more capacity is required. With fully interchangeable components, all hardware (including telephones) can be retained as the system is upgraded. Since the operation of the telephones is identical in all three systems, the need to retrain service technicians and customer's personnel is eliminated. The EK-824 has a capacity of eight lines, 24 stations and 20 talkpaths. The EK-1232 can accommodate 12 lines, 32 stations and 24 talkpaths, while the EK-1648 can accept up to 16 lines, 48 stations and 28 talkpaths.

2.02 The EK-824 1232/1648 uses a Z80 microprocessor for the main operating program. This system employs a space division matrix with stored program control to provide a full range of features. In addition, 6502 and 6504 microprocessors are used as traffic controllers and status reporters. This allows for task sharing between the Central Processing Unit (CPU) and the Station Printed Circuit Boards (PCBs).

2.03 The following paragraphs provide a summary of the major components in a system.

KEY SERVICE UNIT

2.04 The Key Service Unit (KSU) (Figure 1-1) is a wall-mounted, convection-cooled device equipped with replaceable PCBs.

2.05 The PCBs installed in the KSU control the system. They include: a Central Processor Unit (B-CPU-B) PCB; a Tone Generator (B-TGU-B) PCB; Station (B-8SCU-C) PCBs; Single Line Instrument (B-8SLU-B) PCBs and CO Line (B-4COU-A) PCBs. Refer to Section 3 for the required quantities of these printed circuit boards, and Section 5 for detailed installation procedures.

2.06 External connections to the KSU are made by 25-pair cables using type 57 connectors. The KSU cabinet is equipped with standard phono jacks for connecting a customer-provided music source, and a four-wire test jack (omitted on the EK-824 KSU). An RS-232-C connector is

provided for connecting a customer-provided programming terminal and/or Station Message Detail Recording (SMDR) equipment to the system.

POWER SUPPLY

2.07 The power supply (Figure 1-2) is a separate unit that is wall mounted next to the KSU. It provides the DC power requirements for the system.

TELEPHONES

2.08 The EK-824/1232/1648 system uses the following telephones:

- Multibutton Key Telephone with Speakerphone (Handsfree)
- Multibutton Key Telephone without Speakerphone (Monitor)
- Display Multibutton Key Telephone
- Four Button Key Telephone
- One Button Telephone
- Standard single line (2500 type) telephone

2.09 System attendants use Multibutton Key Telephones (with or without display) programmed during installation with special attendant features. In addition, attendants can use Direct Station Selection (DSS) consoles for one-button access to all other telephones in the system.

2.10 Each telephone (except for the 2500 type) is available in either the MERITOR HK/DELPHI BK or ULTRACOM CK model.

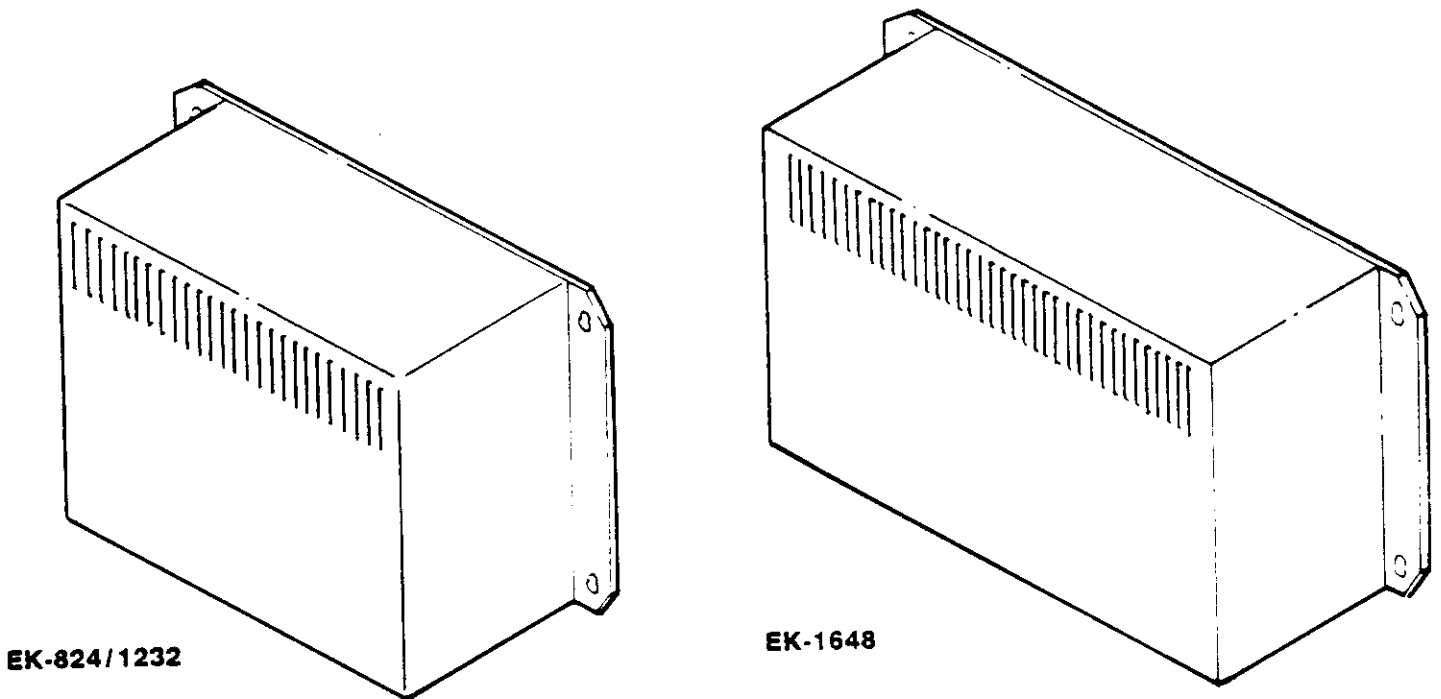


Figure 1-1 KSU, EK-824/1232/1648

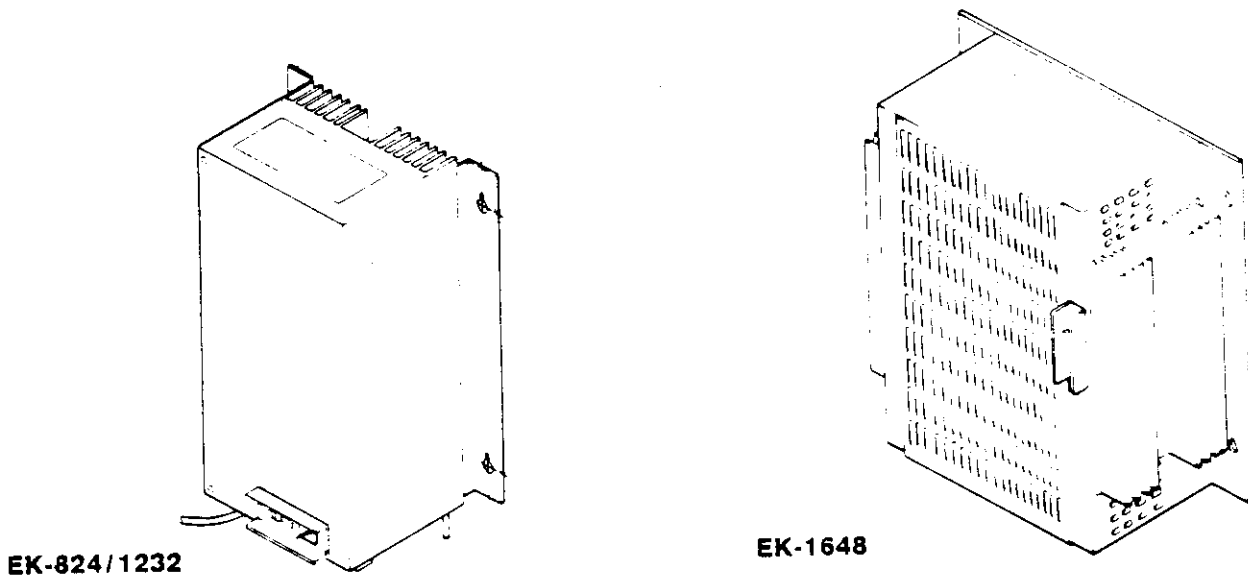


Figure 1-2 POWER SUPPLY, EK-824/1232/1648

MULTIBUTTON TELEPHONES

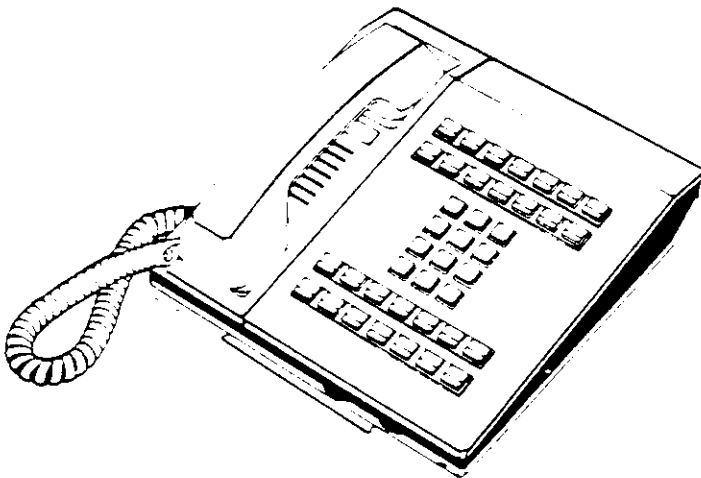
Multibutton Key Telephone

2.11 The Multibutton Key Telephone (Figure 1-3) is the primary station telephone used in the system. The telephone provides rapid access to all station features available in the system.

2.12 The multibutton telephone contains a loudspeaker for tone signaling, Handsfree Intercom calls, paging announcements and Background Music. The telephone can be ordered with a speakerphone (for complete Handsfree operation) or without a speakerphone (for on-hook monitoring of outside calls). Both versions of the Multibutton

Key Telephone allow Intercom calls to be answered Handsfree, without lifting the handset. Outside calls can be placed on Dual Tone Multifrequency (DTMF) or Dial Pulse (DP) lines. In addition, the mode of dialing can be switched in the middle of a dialing sequence to accommodate special services (such as MCI or SPRINT).

2.13 Visual and audible indications provide flash and tone signals that help the user to access the system features. The first 16 keys on the telephone can represent outside lines, DSS keys or Station Speed Dial bins, automatically determined by the feature being used. A Busy Lamp Field is provided for all 16 available lines and up to 16 stations.



ULTRACOM CK



MERITOR HK / DELPHI BK

Figure 1-3 MULTIBUTTON KEY TELEPHONE. EK-824/1232/1648

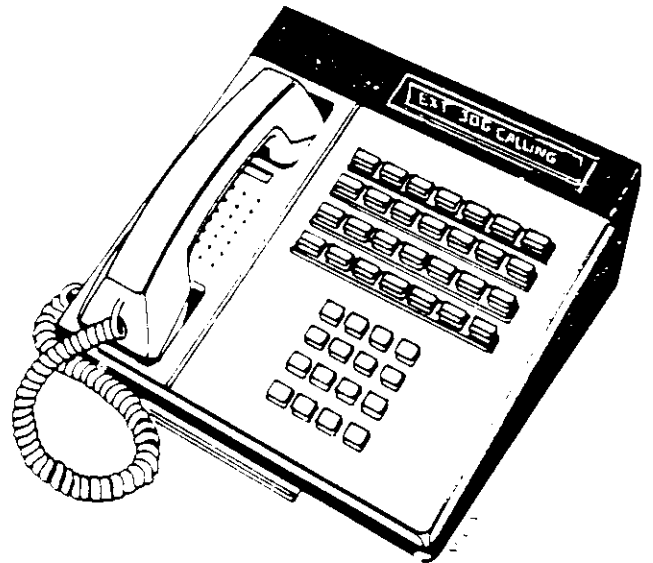
Display Multibutton Key Telephone

2.14 The Display Multibutton Key Telephone (Figure 1-4) provides all of the features of the Multibutton Key Telephone, plus a display window for a visual message

reference. The dial pad has four additional keys which provide for Volume Control (VOL UP, VOL DN), Last Number Redial, and number Save (storage). The display telephone has full Handsfree capability.



ULTRACOM CK



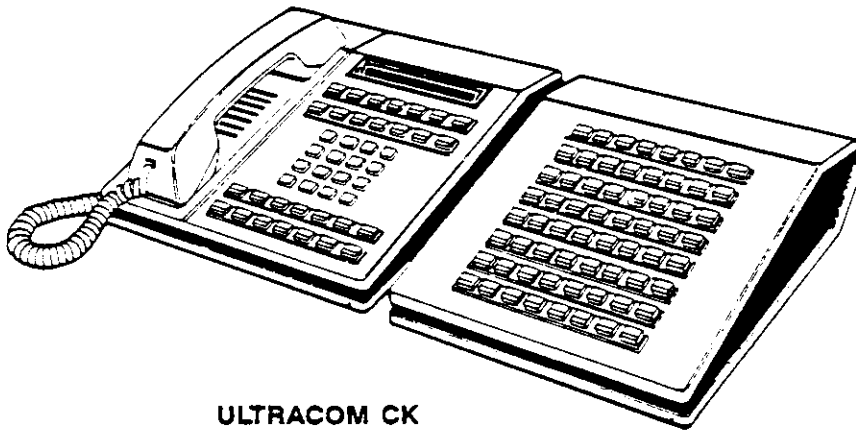
MERITOR HK / DELPHI BK

Figure 1-4 DISPLAY MULTIBUTTON KEY TELEPHONE, EK-824/1232/1648

Multibutton Key Telephone (for Attendant)

2.15 The system attendants use Multibutton and Display Multibutton Key Telephones programmed during installation with several unique attendant features. These features include Alternate Attendant Station, Handsfree Transfer, Release and Barge In. The attendant telephone also allows the system to be put in the night mode (i.e., Night Service activated).

2.16 When the attendant's telephone is used with a Direct Station Selection (DSS) console (Figure 1-5), one button Intercom access to all stations is provided. The DSS console also serves as a Busy Lamp Field for the system. DSS consoles are available in 56 button (dual port) and 64 button (single port) versions.



ULTRACOM CK

Shown with DSS console



MERITOR HK / DELPHI BK

Figure 1-5 MULTIBUTTON KEY TELEPHONE (FOR ATTENDANT), EK-824/1232/1648

FOUR BUTTON KEY TELEPHONE

2.17 The Four Button Key Telephone (Figure 1-6) is used when the sophistication of the multibutton telephone is not required. It provides single button access to many of the commonly used features. Other features are

available by dialing access codes. The LEDs in the feature keys provide a visual indication of feature status. Four Button Key Telephone users can answer Intercom calls Handsfree (with the Handsfree Answerback feature).



ULTRACOM CK



MERITOR HK / DELPHI BK

Figure 1-6 FOUR BUTTON KEY TELEPHONE, EK-824/1232/1648

ONE BUTTON TELEPHONE

2.18 The One Button Telephone (Figure 1-7) allows a wide variety of system features to be accessed by

dialing access codes or pressing the HOLD TRANSFER bar. The One Button Telephone is automatically connected to an Intercom circuit when the handset is lifted.



ULTRACOM CK



MERITOR HK / DELPHI BK

Figure 1-7 ONE BUTTON TELEPHONE, EK-824/1232/1648

SINGLE LINE (2500 TYPE) TELEPHONE

2.19 A standard single line (2500 type) telephone (Figure 1-8) can be used with the system. Single line telephones access system features by using the hookswitch in conjunction with dialed access codes. These telephones are connected to an Intercom circuit when the handset is lifted.

NOTE: Single line (2500 type) telephones must be equipped with special tone ringers.

3. SPECIFICATIONS

3.01 Refer to Table 1-1 for technical specifications pertaining to the system.

4. SITE REQUIREMENTS

4.01 The KSU should be installed in a clean, dry and secure location that is not accessible to unauthorized personnel. This location, as detailed in Section 5, (paragraph 2.02) should comply with Bell Functional Product Class Criteria of September, 1978, in publication PUB 48002 as stated in 3.4.3.2, paragraph C-Indoors With

Environmental Control. The room must have adequate ventilation and a temperature range of 4° to 38° C (40° to 100° F) with 5% to 95% noncondensing relative humidity. Room temperature of 70 degrees is recommended.

NOTE: In order to extend system life, it is advisable to maintain the same environmental conditions as would be maintained for any sophisticated computer system.

4.02 The KSU is designed for wall mounting only. Ample room must be provided at the installation site for mounting the KSU, power supply and related equipment. Maintain at least 3 feet between the room ceiling and the top of the power supply. Install the equipment in an area free from static electricity (dry copiers), excessive vibration (heavy machinery) or dampness.

4.03 The customer must provide a dedicated three-wire 120 V AC, 60Hz circuit. The KSU and power supply will require 15 amp service. A separate ground is required in addition to the third-wire ground on the AC circuit. Refer to Section 5 for grounding requirements. If an optional external paging amplifier is to be installed, it should be connected to an AC circuit other than the dedicated AC line.

CAUTION: THE EQUIPMENT GENERATES AND IS SUSCEPTIBLE TO RADIO FREQUENCY ENERGY. REFER TO SECTION 5, INSTALLATION, FOR DETAILS.

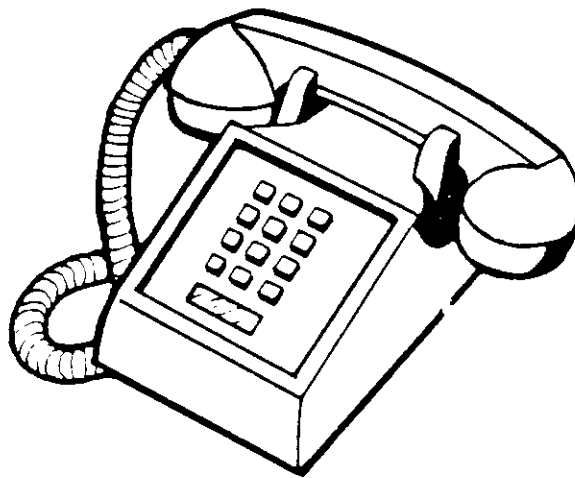


Figure 1-8 SINGLE LINE (2500 TYPE) TELEPHONE, EK-824/1232/1648

5. FCC AND TELCO REQUIREMENTS

5.01 Rules and regulations for the operation and installation of telephone equipment have been established by the Federal Communications Commission (FCC). These rules legalize the use of privately-owned telephones. According to Part 68 (Connection of Terminal Equipment to the Telephone Network) and its amendments, several actions are required before and during installation of customer-provided telephone equipment. These actions include the following:

NOTIFICATION TO TELCO

5.02 As owner of this telephone system, you must give the following information to the operating telephone company before connecting or disconnecting it:

1. Sufficient notice of your intention to use privately owned telephone equipment.
2. The particular lines to be used (telephone numbers xxx-xxxx through xxx-xxxx).
3. Model: EK-1648 A
FCC Registration Number: BJ286G-64139-KF-E
Ringer Equivalence: 2.2B
Registered Jack: RJ21X

FCC APPROVED CONNECTORS

5.03 Connection of this system to telephone company lines must be made with Federal Communications Commission (FCC) approved plugs and jacks.

INSTALLATION CLASSES

5.04 Classes for installation are available through TIE communications, Inc. and its regional offices.

INCIDENCE OF HARM

5.05 The FCC requires that when trouble is experienced, the customer shall disconnect the registered equipment from the telephone line to determine if the registered equipment is malfunctioning. If the registered equipment is malfunctioning, the use of such equipment shall be discontinued until the problem has been corrected.

5.06 When practical, the telephone company must notify the customer that service may be temporarily discontinued if customer provided equipment is causing harm to the telephone network. The telephone company must attempt to inform the customer that service is to be discontinued before actually terminating service. The telephone company must also provide customers with an opportunity to correct the problem and must advise customers of their right to bring complaint procedures before the FCC.

HEARING AID COMPATIBILITY

5.07 FCC rules prohibit the use of non-hearing aid-compatible telephones in the following locations:

- (a) Any public or semipublic location where coin-operated or credit card telephones may be found.
- (b) Elevators, highways, and tunnels (automobile, subway, railroad, or pedestrian) where a person with impaired hearing might be isolated in an emergency.
- (c) Places where telephones are specifically installed to alert emergency authorities such as fire, police, or medical assistance personnel.
- (d) Hospital rooms, residential health care facilities, convalescent homes, and prisons, specifically where

telephones are used for signaling life-threatening or emergency situations if alternative signaling methods are not available.

- (e) Workstations for hearing impaired personnel.
- (f) Hotel, motel, apartment lobbies; in stores where telephones are used by patrons to order merchandise; in public transportation terminals where telephones are used to call taxis, or to reserve lodging or rental automobiles.
- (g) Hotel and motel rooms. At least ten percent of the rooms must contain hearing aid-compatible telephones; or contain jacks for plug-in hearing aid-compatible telephones which will be provided to hearing impaired customers upon request.

Table 1-1 SPECIFICATIONS, EK-824/1232/1648 (Page 1 of 2)

GENERAL SPECIFICATIONS			
System Capacity:	EK-824	EK-1232	EK-1648
CO/PBX Lines	8	12	16
Stations	24	32	48
Dedicated Outside Line Links	8	12	16
Dedicated Intercom Links	9	9	9
Dedicated CO Ring Links	1	1	1
Dedicated Page Links	1	1	1
Dedicated BGM Links	1	1	1
Total System Talkpaths	20	24	28
Private Lines	8	12	16
Hotlines (programmable)	12	16	24
DSS Intercom Keys	16 per multibutton station (programmable)		
Attendant Consoles	2 DSS Consoles		
Paging Zones	8 (7 zones and All Call)		

ELECTRICAL SPECIFICATIONS

Power Requirements:

KSU & Power Supply:
Input: 95 - 130 V AC, (120 V AC nominal); 59-61 Hz, single phase. Requires 15 AMPS service
DC Output: +24 V, -24 V, +5 V
Power supply input and output current ratings are defined on the specifications label attached to the unit.

Power Dissipation:

KSU & Power Supply:
1150 * BTUs/hr.

Each Telephone:
10.0 BTUs/hr.

* Assuming nominal 120 V AC input and fully loaded system (48 stations)

Fusing:

Power Supply (EK-1648):
AC input fuse, 10 AMPS, Slow Blow

Power Supply (EK-824/1232):
AC input fuse, 7 AMPS, Slow Blow

KSU:
F1, 15 AMPS, Fast Acting
F2, 15 AMPS, Fast Acting

Switching Principle:

Solid state space division matrix with stored program control

Cable Requirements:

4 conductor quad station wire, 24 AWG (or equivalent). Maximum cable run up to 2000 feet (610m) for keysets; 10,000 feet (3050m) for 2500-type single line sets, and 800 feet for display telephones.

Table 1-1 SPECIFICATIONS, EK-824/1232/1648 (Page 2 of 2)

ELECTRICAL SPECIFICATIONS (cont'd)						
External Relay Contacts:						
SPST NO						
Maximum Power: 50 VA/30 WATTS						
Maximum Current: 1A						
Maximum Voltage: 125 V AC/150 V DC						
Programmable for Night Ring and/or Page						
Background Music:						
Input Impedance: 22 K OHM						
Input Level: -25 dBV						
Maximum Input: 0.5 VRMS						
Music On Hold:						
Input Impedance: 22 K OHM						
Input Level: -25 dBV						
Maximum Input: 0.5 VRMS						
External Paging:						
Output Impedance: 600 OHM						
Output Level: 20 dBm/600 OHM nominal						
Maximum Output: 6 VRMS						
MECHANICAL SPECIFICATIONS						
Dimensions and Weights:						
EK-1648 KSU:	27 1/4" W	x	17" H	x	13.5" D	55 lbs.
	69cm	x	43cm	x	33cm	25 kg.
EK-1648	14" W	x	14.5" H	x	6" D	40.5 lbs.
Power Supply:	35cm	x	37cm	x	15cm	18.4 kg.
EK-824/1232 KSU:	18.5" W	x	17" H	x	13.5" D	40 lbs.
	47cm	x	43.5cm	x	34.5cm	18 kg.
EK-824/1232	9.5" W	x	15" H	x	6" D	25 lbs.
Power Supply:	24cm	x	38cm	x	15cm	11 kg.
ENVIRONMENTAL SPECIFICATIONS						
Environmental Operating Conditions:						
Temperature:						
4° to 38° C (40° to 100° F)						
Humidity:						
5% to 95% relative, noncondensing						
(Reference Bell Functional Product Class Criteria of September 1978 publication PUB 48002.)						
FCC REGISTRATION						
Model: EK-1648A						
FCC Registration Number: BJ286G-64139-KF-E						
Ringer Equivalence: 2.2B						
Registered Jack: RJ21X						

EK-824/1232/1648 ELECTRONIC KEY TELEPHONE SYSTEM SECTION 2, FEATURES

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1. INTRODUCTION

1.01 The FEATURES Section provides information on the features of the system. This section consists of detailed descriptions of each feature. Also included is reference information on LED flash patterns (Figure 2-1), tone signaling patterns (Figures 2-2a and 2-2b), display messages (Table 2-1) and telephone key callouts (Figures 2-3 through 2-8).

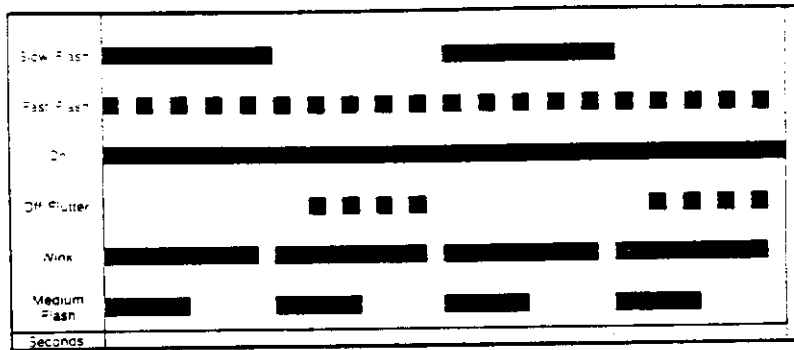
2. FEATURES

2.01 Each feature is described by the following headings: Description, Conditions, Required Programming and Feature Reference. The headings are defined as follows: **Description** consists of a general feature definition, followed by an explanation of its application in the system.

Conditions provides the limits for the feature (e.g., maximum number of Call Waiting indications allowable at any one time). The Conditions heading also presents any qualifying information not covered in the Description heading, and any prerequisites that must be met before the feature can be used.

Required Programming includes any programming that must be done to provide for proper feature operation.

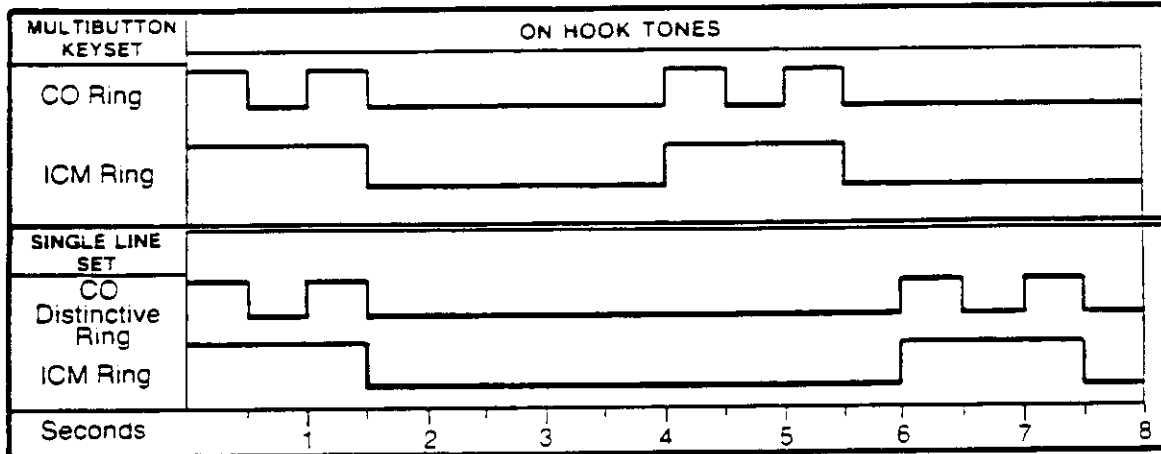
Feature Reference is a list of all features which may affect the feature being defined.



RATE	FUNCTION	KEY USED
1. LED ON	CO LINE CONFERENCE SET UP CO LINE IN USE DSS MODE ON HANDSFREE MODE ON MEMORY DIAL IN USE OTHER PHONE IS BUSY	HOLD KEY CO LINE KEY INT KEY HF KEY OUT/MEM (MEM) KEY DSS KEY OR HOTLINE KEY
2. SLOW FLASH	ALT MODE ON CALLBACK RING CO INCOMING RING DND MODE ON INCOMING ICM RING MIC MUTE ON NIGHT MODE ON OTHER PHONE IN DND OUTGOING PAGE PAGE RECEIVED	ALT KEY ON ATTENDANT C.BACK KEY CO LINE KEY DND KEY INT KEY MIC MUTE KEY INT KEY ON ATTENDANT DSS KEY OR HL KEY PAGE KEY PAGE KEY
3. MEDIUM FLASH	CALL FORWARDING MODE ON EXCLUSIVE HOLD * LINE QUEUE CALL BACK PRIVACY RELEASED	HOLD KEY CO LINE KEY ON HOLDING STATION CO LINE KEY CO LINE KEY
4. FAST FLASH	CALLBACK WAITING DSS CALL ORIGINATE INTERCOM CALL WAITING HOTLINE CALL ORIGINATE I-HOLD (INITIATING STATION) LINE QUEUE ORIGINATE MEMORY DIAL IN USE MEMORY DIAL PROGRAMMING VOICE ANNOUNCE CALL RECEIVED	C.BACK KEY DSS KEY HOLD KEY HL KEY CO LINE KEY C.BACK KEY MEMORY DIAL BIN KEY OUT/MEM (MEM) KEY AND BIN KEY HF KEY
5. OFF/FLUTTER	CO LINE TRANSFER RECEIVED INTERCOM CALL WAITING HOLD RECALL	CO LINE KEY DSS CONSOLE KEY CO LINE KEY
6. WINK	I-HOLD (NON INITIATING STATION) MESSAGE WAITING	CO LINE KEY MSG. WAIT KEY AND DSS CONSOLE KEY

* Exclusive Hold will appear as a steady LED to all other stations.

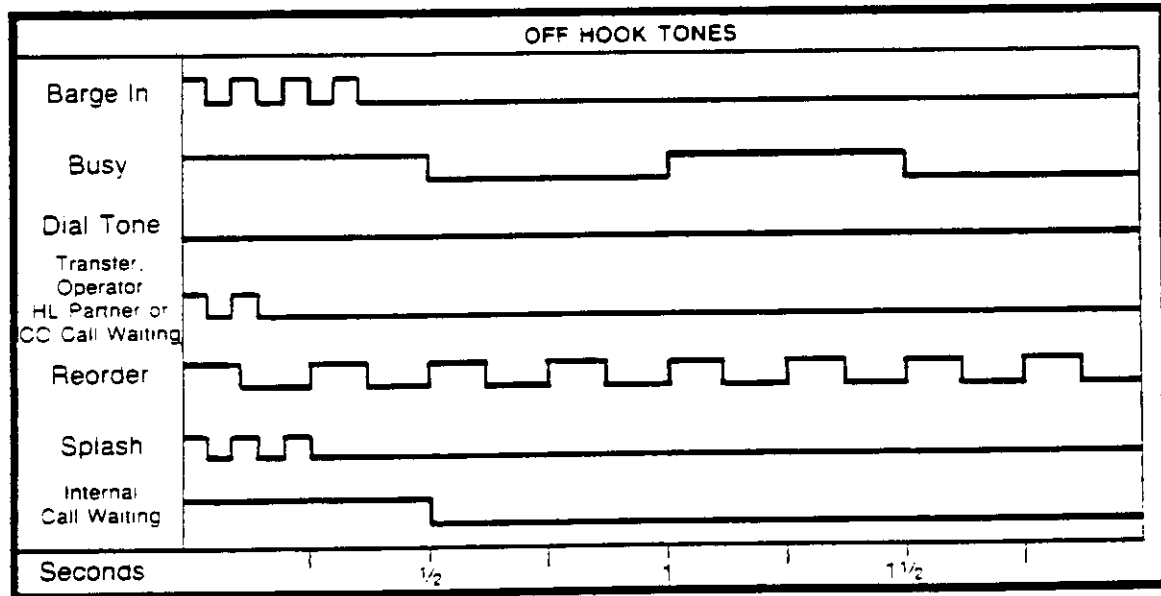
Figure 2-1 FLASH PATTERNS. EK-824/1232/1648



01333-5-01-A

NOTE: Tone bursts occur during on periods.

Figure 2-2a ON-HOOK TONE PATTERNS, EK-824/1232/1648



01333-5-02-A

NOTE: Tone bursts occur during on periods.



Figure 2-2b OFF-HOOK TONE PATTERNS, EK-824/1232/1648

Table 2-1 DISPLAY MESSAGES, EK-824/1232/1648 (Page 1 of 2)

DISPLAY MESSAGE	DEFINITION
BARGE IN TO YYY	Attendant is barging in to Station YYY - will display on attendant's station.
CALL BACK CO XX	This message is displayed continually with a Callback ring (at the station initiating the Callback signal), or until the station user picks up the handset. This tells the user that a line which a queue had been requested on is idle. The line is automatically connected when it goes off hook (idle), and appears busy to all other stations to prevent them from gaining access to the line during the call.
CALL BACK ST YYY	This message is displayed along with Intercom ringing if an Intercom call is unanswered. If the handset is lifted, the display message clears. This tells the station user that the station which a Callback was left at is now idle. The Intercom call is automatically connected when the handset is lifted.
CLOCK STARTED	If the attendant presses INT and dials 728, this message is displayed on the attendant telephone. It indicates that the clock has restarted.
CLOCK STOPPED	If the attendant presses INT and dials 720, this message is displayed on the attendant telephone. It indicates that the clock has been stopped.
CLR ALL CALL FWD	This message appears at the attendant's station when all Call Forwards are cleared.
DATE NN*	If the attendant presses INT and dials 725, this message is displayed on the attendant telephone. It indicates that a new day (01-31) entry is to be made.
DAY NN*	If the attendant presses INT and dials 724, this message is displayed on the attendant telephone. It indicates that a new day of week (i.e., 01 = SUN, 07 = SAT) entry is to be made.
DIGITS	Digits dialed will appear during CO calls, Intercom calls, and bin programming.
DISABLE LINE XX	This message appears when the attendant dials 7XX to disable (busy out) line XX.
DO NOT DISTURB	This message appears at the initiating station when the DND key is pressed.
8888888888888888	This message appears from 12 to 1 AM to exercise all segments of the display.
ENABLE LINE XX	This message appears when the attendant dials 7XX to clear line XX.
EXTENSION YYY	This message indicates the extension called via the Intercom (at the initiating extension).
EXT YYY CALLING	This message indicates that a call has been received from another station. This information is displayed at the receiving station.
EXT YYY WAITING	If station YYY has left a Call Waiting at another station, this message will appear at the called station.
FORCED RING OFF	This message appears when 718 is dialed to disable Forced Intercom Ringing.
FORCED RING ON	This message appears when 717 is dialed to enable Forced Intercom Ringing.
FORWARD FROM YYY	If a station receives a call which has been forwarded from station YYY, this message appears at the receiving station.
FORWARD TO YYY	This message will appear at a station when its calls have been forwarded to station YYY.
HOLD LINE XX	This message appears when a CO Line (XX) is put on Hold.
HOURL NN*	If the attendant presses INT and dials 721, this message is displayed on the attendant telephone. It indicates that a new hour (00-23) entry is to be made.
LINE XX	When selecting an outside line, or answering an incoming CO line, that line number will appear as XX (at the initiating station).
MINUTE NN*	If the attendant presses INT and dials 722, this message is displayed on the attendant telephone. It indicates that a new minute (00-59) entry is to be made.

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NOTE: NN indicates two digit number

XX indicates CO calls or the work forwarded to

YY indicates three terminal or the time system

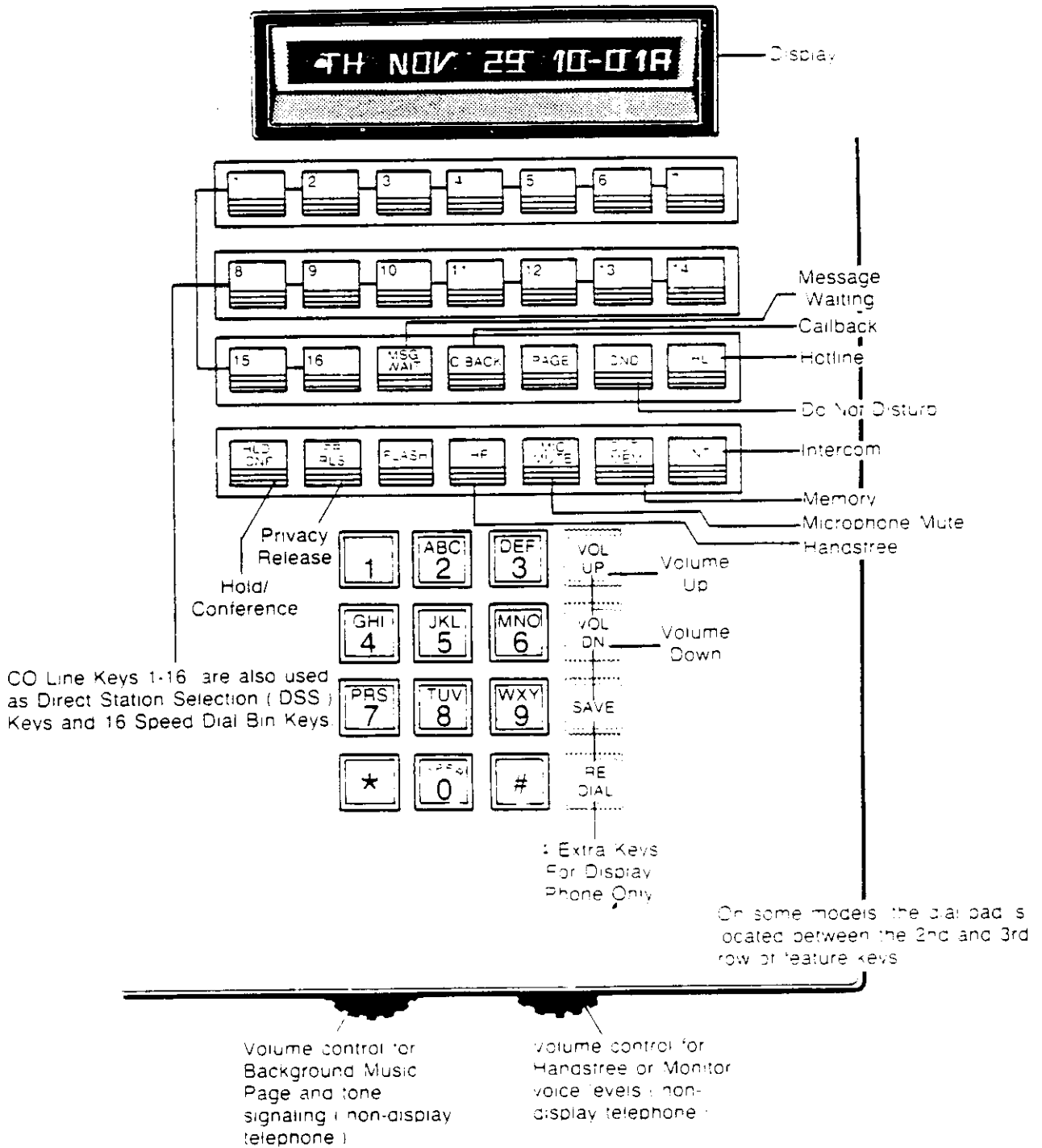
Table 2-1 DISPLAY MESSAGES, EK-824/1232/1648 (Page 2 of 2)

DISPLAY MESSAGE	DEFINITION
MONTH NN*	If the attendant presses INT and dials 726, this message is displayed on the attendant telephone. It indicates that a new month (01-12) entry is to be made.
MSG FROM EXT YYY	This message is displayed at the receiving station along with an audible tone when someone has left a Message Waiting signal at a station.
NIGHT MODE OFF	If "2" is pressed a second time by the attendant, Night Mode will be disabled, and this message will appear.
NIGHT MODE ON	If "2" is pressed by the attendant when the keypad is idle, Night Mode will be enabled, and this message will appear.
NUMBER SAVED	This message appears when a number is stored with the SAVE key.
NUMBER TO BIN XX	This display will appear after pressing the OUT/MEM (MEM on attendant) key and one of the 16 location keys in order to program Intercom DSS keys or Speed Dial bins.
PROGRAM COMPLETE	After a dial pad entry (Intercom DSS or Speed Dial) is completed, and the Bin key is pressed a second time, this message is displayed.
PROGRAM MEMORY	When the OUT/MEM (MEM on attendant) key is initially pressed (for Intercom DSS or Speed Dial programming), this message will appear, reminding the station user that they are programming Station Speed Dial or Intercom DSS keys.
RINGING YYY	If a station is calling station (YYY), this message will appear at the initiating station.
SECOND NN*	If the attendant presses INT and dials 723, this message is displayed on the attendant telephone. It indicates that a new second (00-59) entry is to be made.
THIS IS EXT YYY	When the power is turned on, the reset button is pushed, the telephone is plugged in, or "1" is pushed at an idle telephone, this message will appear.
TIMER 00-11	This message appears showing the elapsed time (in hours and minutes) of a CO call. The timer is displayed when the VOL UP is pressed. The time of day is displayed when the VOL DOWN key is pressed.
TOLL RESTRICTED	If a station attempts to dial a call not allowed by Class of Service, this message appears.
WAITING FOR YYY	If a station has left a Call Waiting indication at station (YYY), this message will appear at the initiating station.
XX HOLD RCL YYY	This message will appear only at the attendant's console when a call at a station has been on Hold too long and has reverted to the attendant's station.
XX TRANS FROM YYY	When a station user transfers a call, this message appears at the receiving station, informing the station user which station initiated the transfer.
XX TRANS RCL YYY	This message appears only at the attendant's station. This message tells the attendant that a transferred call sent to a station (YYY) was unanswered, and it is now recalling the attendant.
XX TRANS TO YYY	When a station user transfers a call, this message indicates which station will receive the transfer.
YEAR NN*	If the attendant presses INT and dials 727, this message is displayed on the attendant telephone. It indicates that a new year (00-99) entry is to be made.
YYY BARGING IN	Station YYY is Barging In on you.
YYY BUSY	If a station attempts to reach another busy station (YYY), this message is displayed.
YYY DND	If a station attempts to reach another station which is in the Do Not Disturb mode, this message will appear.
YYY NOT EXIST	This message is displayed when a station attempts to reach another station which is invalid, empty or defective.

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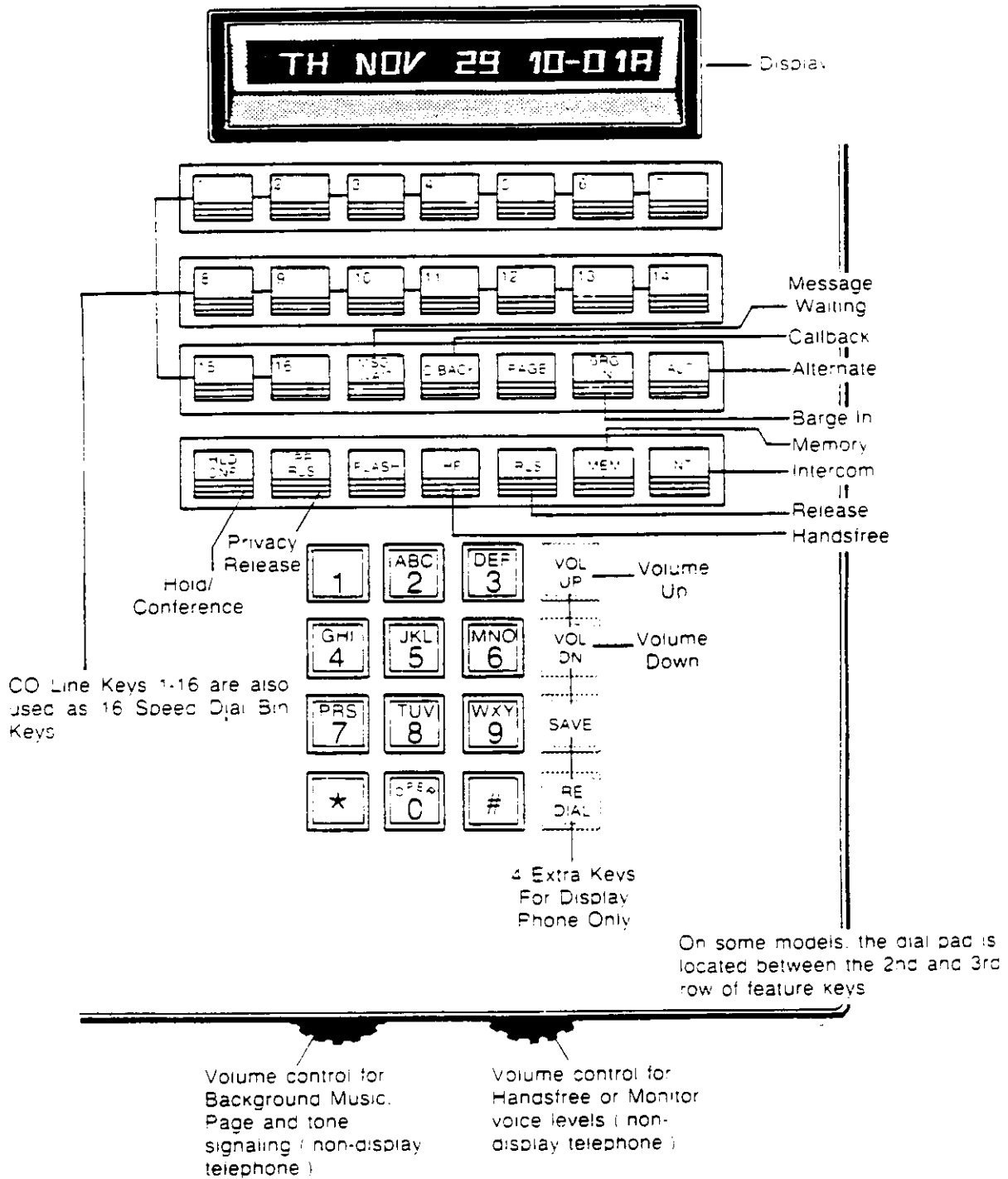
NOTE: NN, indicates two digit number; XX, indicates CO pairs or one of 16 storage bins; YYY, indicates remote stations in the system.



NOTE:

- a) On some multibutton telephones without displays, the HF key is replaced by a MON key. These telephones use the Monitor feature instead of the Handtree feature.
- b) This key configuration can also be used by the attendant if a DSS contest is not programmed.

Figure 2-3 MULTIBUTTON TELEPHONE KEY CALLOUTS, EK-824/1232/1648



NOTE:

(a) This key configuration is valid only if the attendant has a DSS console assigned in programming.

Figure 2-4 ATTENDANT TELEPHONE KEY CALLOUTS. EK-824/1232/1648

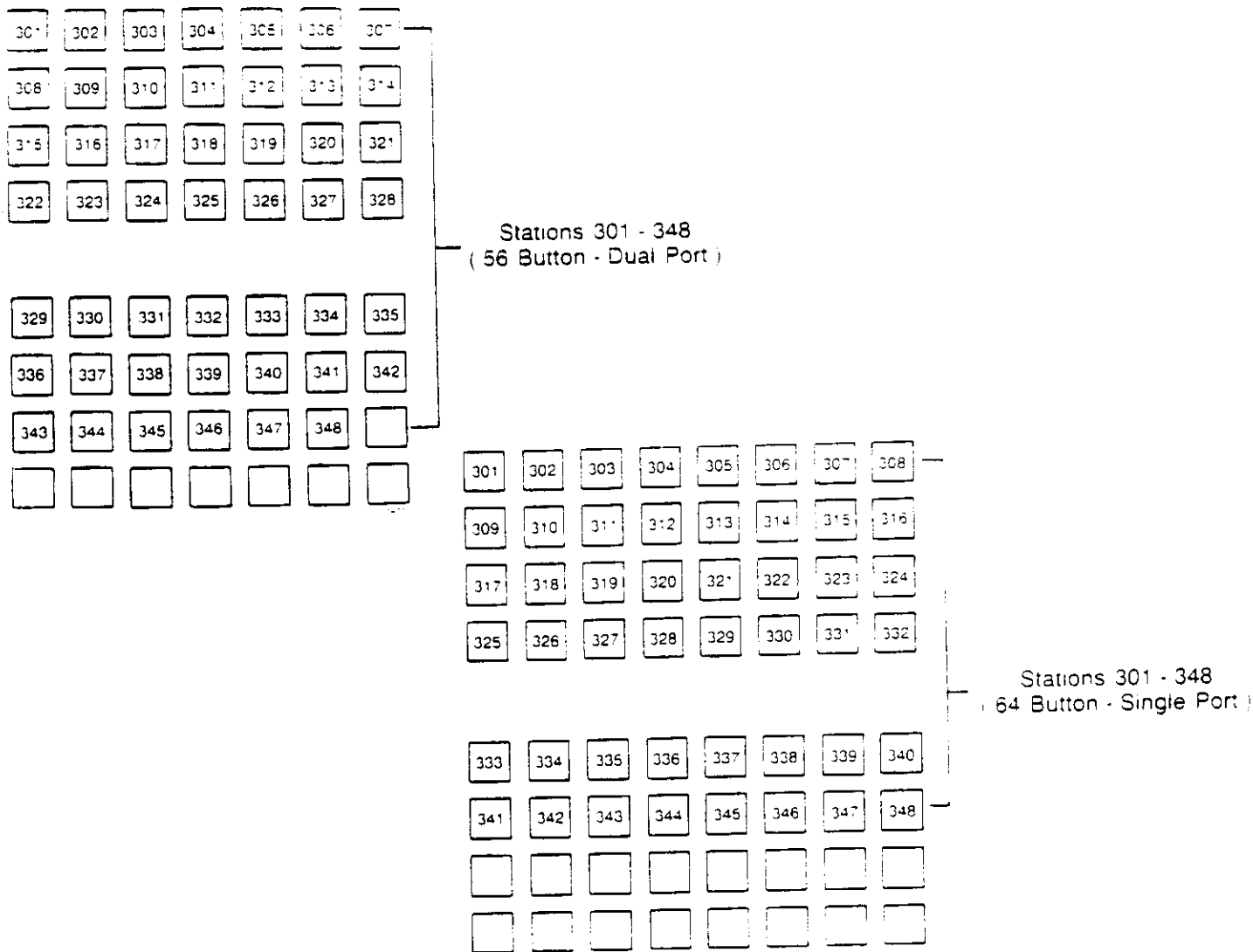


Figure 2-5 DSS CONSOLE KEY CALLOUTS, EK-824/1232/1648

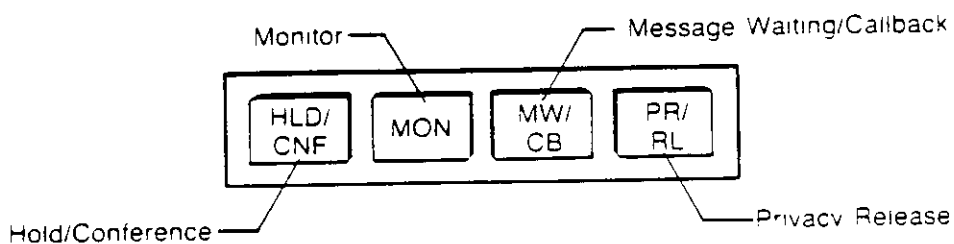


Figure 2-6 FOUR BUTTON TELEPHONE KEY CALLOUTS, EK-824/1232/1648

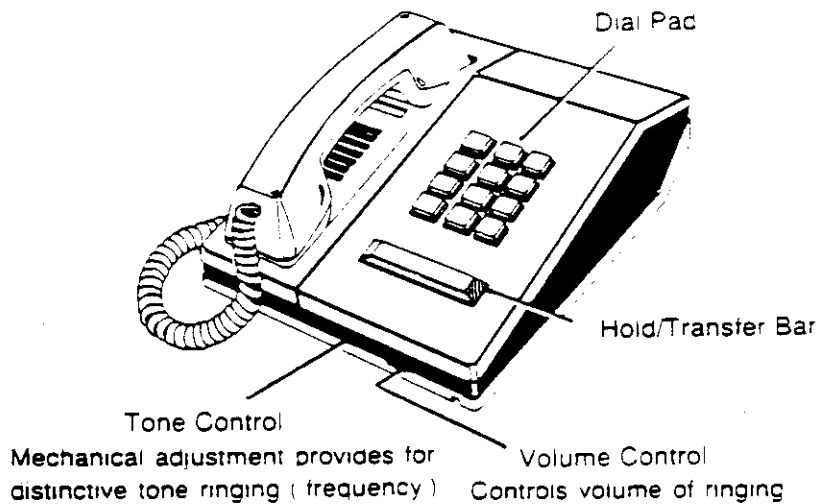


Figure 2-7 ONE BUTTON TELEPHONE, EK-824/1232/1648

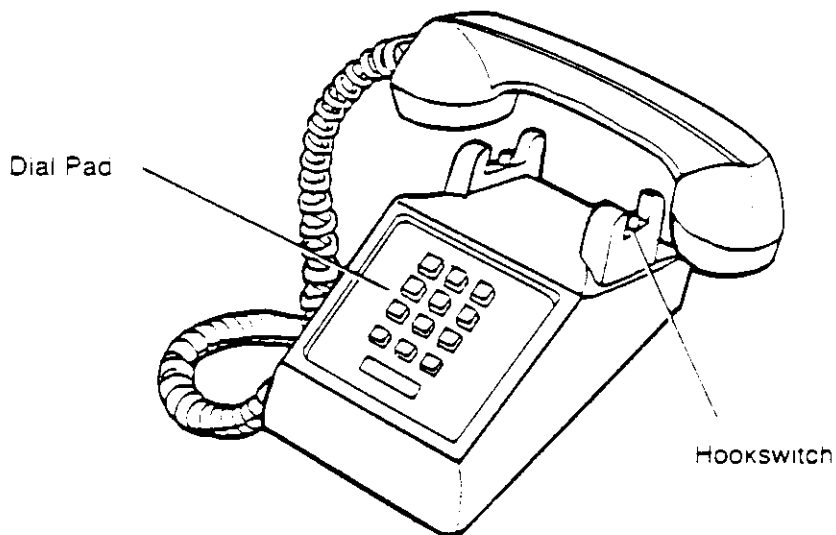


Figure 2-8 SINGLE LINE (2500 TYPE) TELEPHONE, EK-824/1232/1648

2.02 The following features are available with the system.
The features are arranged in alphabetical order.

NOTE: When the system is used behind a Private Branch Exchange (PBX), some of the features may not function exactly as described.

ACCOUNT CODE CAPABILITY

Description:

The system permits the user to categorize all calls for Station Message Detail Recording (SMDR) purposes with Account Codes. An Account Code is a number, of up to nine digits, that is printed on the SMDR to aid in identifying calls. This feature allows an accurate record of calls to be maintained for billing purposes.

Account Codes can be assigned to outgoing calls and calls in progress.

Conditions:

(a) Account Codes can be assigned by any station in the system.

(b) Account Codes can be entered manually, while the call is in progress or as it is being placed. In addition, Speed Dial Directives allow Account Codes to be programmed into Speed Dial bins.

Required Programming: not applicable

Feature Reference:

Answering a Call
Placing a Call
SMDR
Speed Dial Directives

ALERT TONE/PRIVACY TONE

Description:

An Alert Tone is a reoccurring tone transmitted to a station that indicates that the station is in the Handsfree Answerback mode. This tone prevents another station in the system from using the Handsfree Answerback feature for unauthorized monitoring of conversations. The Alert Tone is also used to indicate that a Barge In is still active.

Conditions:

- (a) Alert Tone is valid for all telephones with speakers (e.g., multibutton and four button sets).
- (b) An Alert Tone is not transmitted if a ringing Intercom call is answered using the HF or MON key, or if the Speakerphone is used to place a Handsfree CO call.

Required Programming:

- C: TMRS (PRV TONE) to set the interval between Alert Tones.
- F: FLGS (PRV TONES) to enable Alert Tones for the system.
- ST: OPTS (TYPE) to assure that correct telephone type is assigned.

Feature Reference:

Barge In
Handsfree Answerback

ALTERNATE ATTENDANT STATION

Description:

Alternate Attendant Station allows the attendant to direct all Intercom and transferred calls, initially intended for the attendant, to the alternate attendant. If the attendant redirects calls to the alternate, incoming CO calls ring at both the attendant and alternate attendant. When calls are not redirected, incoming CO calls ring at the attendant and, after a programmable interval, at the alternate attendant also.

Conditions:

- (a) The attendant and the alternate attendant must be multibutton or display telephones.
- (b) The attendant station must have a DSS console assigned to it in programming. If the console is not programmed, the ALT (Alternate) key on the attendant telephone functions as an HL (Hotline) key.
- (c) In a system with two attendants, each attendant can be the alternate of the other; however, both attendants must be in the same tenant group.
- (d) If the alternate station does not have a DSS console assigned to it in programming, it will function as a multibutton telephone.

Required Programming:

- O: OPRS to assign attendants, alternates and consoles.
- C: TMRS (ALT OP XFER) to program the interval before an unanswered incoming CO call will ring at the alternate.
- S: ST OPTS to determine the options for the attendant and alternate, and to assign DSS consoles.
- K: TENANTS for tenant group assignments.

Feature Reference:

Answering a Call
Intercom
Transfer

ANSWERING A CALL

Description:

An incoming call can be answered at any station programmed for incoming access to the line. Calls can be answered with the handset, or Handsfree (if the telephone is equipped with a speakerphone).

Conditions:

A call coming into the system will cause its associated line key LED to flash. An incoming call will ring at a station only if CO audible is granted for that line in station programming. A ringing line (with a flashing line key LED) can be answered only if incoming CO access is granted.

Required Programming:

S: ST OPTS (CO AUD DY and CO INC DY) to program ringing and incoming access for each line, at each station.
L: CO OPTS to program line options.

Feature Reference:

Handsfree
Night Service
Split Ringing

BARGE IN

Description:

Barge In permits the attendant to intrude into a conversation in progress at another station. Four splash tones and a four second delay will precede the attendant joining the conversation.

Conditions:

- (a) Barge In may be blocked on a station by station basis.
- (b) Each attendant in the system must be selectively enabled for Barge In.
- (c) The attendant station must have a DSS console assigned to it in programming. If a console is not assigned, the BRG.IN (Barge In) key functions as the DND (Do Not Disturb) key.

Required Programming:

O: OPRS to assign operators.
F: FLGS (OP ≠ BRG IN) to enable Barge In for each operator.
S: ST OPTS (RCV BRG IN) to allow stations to receive or block Barge In.

Feature Reference:

Privacy

BUSY-OUT LINES

Description:

Busy-Out Lines allows the attendant to take a CO line out of service by making it appear busy to the system.

Conditions:

(a) Lines can be busied out at the programming terminal, independent of the attendant.

(b) Any line busied out at the programming terminal can be put back in service by the attendant. Any line busied out by the attendant can be put back in service at the programming terminal.

Required Programming:

L: CO OPTS to program installed lines.

Feature Reference:

Placing a Call

CALLBACK

Description:

Callback enables a station user to leave a Callback request at a busy station. When the busy station becomes free, Callback automatically rings the station which placed the Callback request. Answering the Callback ring automatically calls the station where the Callback request was initially left. If the Callback is interrupted (i.e., the called station receives another call), the Callback procedure begins again.

Conditions:

(a) Callback cannot be initiated from single line (2500 type) and one button telephones.

(b) A multibutton or four button station user can place a Callback request to any telephone in the system, except for the attendants. Each telephone can only have one Callback request placed on it.

(c) A Callback cannot be left at a station in Do Not Disturb.

Required Programming:

S: ST OPTS (TYPE) to assign type KEY to multibutton and display telephones.

Feature Reference:

Intercom

CALL FORWARDING

Description:

Call Forwarding permits any multibutton or display telephone to forward all calls to another station or to the attendant. A flashing HLD/CNF key at the forwarding station indicates that Call Forwarding has been activated.

Conditions:

- (a) Call Forwarding is denied to single line (2500 type), one button and four button telephones; however, these telephones can receive forwarded calls.
- (b) A station can receive forwarded calls to which it normally would be denied access.
- (c) The attendant can cancel all Call Forwarding in the system.
- (d) Only one level of Call Forwarding is allowed (i.e., Call Forwards cannot be chained).

Required Programming:

S: ST OPTS to program multibutton and display telephones as KEY.

Feature Reference:

Answering a Call
Transfer

CALL WAITING

Call Waiting allows signals to be sent to a station to indicate that a CO, attendant or internal (Intercom) call is waiting to be answered. A station must be busy on a call to receive Call Waiting signals.

Call Waiting, CO Call

Description:

When busy on another call, a station can receive a signal that an outside (CO) call is waiting to be answered. The outside call may be a call ringing into the station or a call transferred from another station. The CO Call Waiting indication is a double beep.

Conditions:

- (a) If busy on an outside call, the call may be put on Hold before the Call Waiting is answered. If busy on an Intercom call, the Intercom call must be terminated before the Call Waiting can be answered.
- (b) Unless the Call Waiting is in response to a transferred call, the station must be granted incoming audible in order to receive the Call Waiting tones.

Required Programming:

- C: TMRS (CO CALL WTG) to program the interval between CO Call Waiting indications.
- F: FLGS (CO CALL WTG) to allow CO Call Waiting on a system wide basis.
- S: ST OPTS (CO CALL WTG and CO AUD) to allow CO Call Waiting on a station by station basis.

Feature Reference:

Answering a Call
Transfer

Call Waiting, Internal

Description:

Internal Call Waiting provides a station, busy on another call, with an indication that an internal call is waiting to be answered. The Internal Call Waiting signal is a single beep if the call is from another station; two beeps if the call is from the attendant or Hotline partner.

Conditions:

(a) If busy on an outside call, the call may be put on Hold before the Call Waiting is answered. If busy on an Intercom call, the Intercom call must be terminated before the Call Waiting can be answered.

(b) All stations and the system attendants can selectively block Internal Call Waiting signals.

Required Programming:

F: FLGS (OP # INT CALL WTG) to permit Internal Call Waiting signals to be blocked by the system attendants.
S: ST OPTS (INT CALL WTG) to permit individual stations to block Internal Call Waiting signals. This sub-field does not have any effect on the attendant stations.

Feature Reference:

Answering a Call
Hotline
Intercom

CLASS OF SERVICE

Description:

The system uses comprehensive Class of Service (COS) programming to help determine the dialing restrictions on outgoing calls. There are eight restrictive Classes of Service (COSs 1-8), and a totally unrestrictive Class of Service (COS 0). Toll Restriction programming allows for completely flexible Class of Service restrictions tailored to the requirements of the installation.

If complete Class of Service flexibility is not required, the system default program provides the Class of Service dialing restrictions outlined below.

Code:

N is one digit, any digit 2 through 9.
P is one digit, any digit 0 or 1.
X is one digit, any digit 0 through 9.
n is one digit, any digit 0 through 9.

Class of Service 0

Any number can be dialed.

Class of Service 1

- (a) Dialing 0 (operator) or 11 is not allowed.
- (b) Dialing 10 is allowed only if the line is programmed as a 10 + line in L: CO OPTS.
- (c) Dialing 1 + area code (1 + NPX) is not allowed.
- (d) Dialing 1 + exchange (1 + NNX), area codes (NPX), local exchanges (NNX), emergency numbers (1 + N11) or WATS (1 + 800) is allowed.
- (e) Intercom calls are allowed.

Class of Service 2

- (a) Dialing 0 (operator) or 11 is not allowed.
- (b) Dialing 10 is allowed only if the line is programmed as a 10 + line in L: CO OPTS.
- (c) Dialing 1 + area code (1 + NPX) and 1 + exchange (1 + NNX) is not allowed.
- (d) Dialing area codes (NPX), exchanges (NNX), emergency numbers (1 + N11) or WATS (1 + 800) is allowed.
- (e) Intercom calls are allowed.

Classes of Service 3 through 8

- (a) Dialing 0 or 11 is not allowed.
- (b) Dialing 10 is allowed only if the line is programmed as a 10 - line in L: CO OPTS.
- (c) Dialing 1 + area codes (1 + NPX), area codes (NPX), 1 - exchange (1 + NNX) or exchanges (NNX) is not allowed.
- (d) Dialing emergency numbers (1 + N11) or WATS (1 + 800) is allowed.
- (e) Intercom calls are allowed.

Conditions:

- (a) The codes 1 + area code (1 + NPX) and 1 + exchange (1 + NNX) are applicable only in areas where a leading 1 is required for toll calls.
- (b) Refer to Toll Restriction for additional dialing restriction information.
- (c) In the default program, all lines are initialized for leading 1 service.

Required Programming:

- T: TOLL RES. to tailor the dialing restrictions to the requirements of the installation.
- L: CO OPTS to program lines for compatibility with the type of service (i.e., leading 1, non-leading 1).

Feature Reference:

- Placing a Call
- Toll Restriction

CONFERENCE

Up to three parties can be connected for a Conference call. There are two types of Conference: Add-On Conference and Line Conference.

Conference, Add-On

Description:

Add-On Conference permits a second internal party to be added to an existing outside call.

Conditions:

Any telephone in the system can join an Add-On Conference; however, single line (2500 type) and one button telephones cannot initiate an Add-On Conference.

Required Programming:

Programming does not affect the ability of telephones to initiate or join an Add-On Conference.

Feature Reference:

- Answering a Call
- Placing a Call

Conference, Line

Description:

Line Conference allows an internal party to add an additional outside party to an existing outside (CO) call.

Conditions:

- (a) Single line (2500 type) and one button telephones cannot establish a line conference.
- (b) Stations must have access to both lines to be joined in conference.
- (c) If the conference is not established within the Hold Recall interval, the initial call will revert to the attendant.

Required Programming:

S: ST OPTS (COS LINE, CO INC, and CO OUT) to allow stations to answer and place calls.

Feature Reference:

Answering a Call
Hold Recall
Placing a Call

DATE AND TIME

Description:

Date and time information is used for SMDR and display telephone presentations. The date and time can be entered from the programming terminal or from the attendant's station. Data entered includes the hour, minutes past the hour and seconds; month, day of the month and year; and the day of the week.

Conditions:

The Real Time Clock Daughter Board is installed on the B-TGU-B Printed Circuit Board if a precise time clock is required.

Required Programming:

D: DATE to program Date and Time information from the programming terminal.

Feature Reference:

Station Message Detail Recording

DIRECT STATION SELECTION (DSS)

Description:

Direct Station Selection (DSS) allows users of multibutton and display telephones one button Intercom access to other stations in the system. DSS permits station users to press a DSS key to access a desired station, rather than by dialing a code. The DSS keys can also be used to provide a Busy Lamp Field (BLF) for the stations to which the keys are assigned.

Multibutton and display telephones have 16 DSS keys, which are assigned by the default program to stations 301-316. The telephone user can, however, change the DSS assignments to meet individual needs.

System attendants have full system DSS and BLF capability if they are installed with DSS consoles.

Conditions:

- (a) The multibutton or display telephone user must press the INT key to put the telephone in the DSS mode.
- (b) The attendant DSS console provides DSS keys and a BLF for all stations in the system, and is not programmed by the user. When an attendant station has a DSS console assigned to it in programming, the DSS keys on the attendant's telephone do not function.
- (c) If an attendant station does not have a DSS console assigned to it in programming, the attendant's telephone has 16 programmable DSS keys.
- (d) The system allows two DSS consoles to be programmed and installed, each assigned to its respective attendant.

Required Programming:

- (0) OPRS to assign DSS consoles to system attendants. DSS console keys for multibutton and display telephone users are programmable from the telephone.

Feature Reference:

Intercom

DISTINCTIVE RINGING

Description:

Distinctive Ringing provides different ringing patterns for Intercom and CO calls into a station. Distinctive Ringing is available on all telephones, but must be programmed for single line (2500 type) and one button telephones.

For single line (2500 type) and one button telephones, Distinctive Ringing provides an Intercom ring signal (tone burst) of 1.5 seconds followed by a 4.5 second pause. CO line ring consists of two short ring bursts followed by a 4.5 second pause. If Distinctive Ringing for single line (2500 type) and one button telephones is disabled, Intercom calls ring identically to CO calls (i.e., one ring burst followed by a pause).

Multibutton and four button telephones always have Distinctive Ringing enabled. The Intercom ring signal is a 1.5 second burst followed by a 2.5 second pause. The CO ring signal is two short bursts followed by a 2.5 second pause.

Conditions:

- (a) Distinctive Ringing, if enabled, affects all single line (2500 type) and one button telephones in the system.
- (b) Distinctive Ringing requires a B-8SLU-B PCB with software version 177-114-02 or 177-114-03.

Required Programming:

- F: FLCS (SLI CO) INT RNG to enable Distinctive Ringing for single line (2500 type) and one button telephones.

Feature Reference:

Answering a Call
Intercom

DO NOT DISTURB (DND)

Description:

Do Not Disturb allows multibutton and display telephone users to block all incoming CO and Intercom calls. If DND is enabled, callers attempting to reach a station in the Do Not Disturb mode will receive a reorder tone.

Conditions:

(a) The attendant and Hotline partner can override DND, but only if the telephone which has activated DND is not busy on another call.

(b) The attendant (programmed with DSS console), single line (2500 type), one button and four button telephones do not have DND capability.

(c) If the attendant station does not have a DSS console assigned to it in programming, the BRG.IN key functions as a DND key. Do Not Disturb is allowed.

Required Programming: not applicable

Feature Reference:

DND Override

DO NOT DISTURB OVERRIDE

Description:

Do Not Disturb Override permits the attendant and Hotline partner (if assigned) to override DND.

Conditions:

Normally, DND Override will be a voice announcement; however, if Forced Intercom Ringing is enabled on a station or system wide basis, DND Override calls will ring.

Required Programming:

S: ST OPTS (HOTLINE) to assign Hotline partners.

O: OPRS to assign operators.

F: FLGS (RNG INT CALLS) to enable Forced Intercom Ringing on a system wide basis.

Feature Reference:

DND

Forced Intercom Ringing

EQUAL ACCESS COMPATIBILITY

Description:

The system toll restriction scheme is compatible with Equal Access. Equal Access allows telephone company customers to select a primary carrier for dialing toll calls. When a user dials 1 plus the area code and number, the call will go out on the customer's preselected primary carrier service. To dial toll calls on services other than the primary carrier service, the user dials 10, the desired carrier's three-digit code, 1, the area code and the telephone number. Codes are assigned to each carrier by the telco where the system is installed.

Conditions:

The system must be installed in an Equal Access area. In addition, the 10XXX codes must be provided by the telco.

Required Programming:

- T: TOLL RES. (P: OCC EQ. ACCS. NOS.) to program the Equal Access codes used for 10 + dialing.
- L: CO OPTS to enable lines for 10 + dialing.

Feature Reference:

Placing a Call
Toll Restriction

FLASH

Description:

Flash allows a multibutton or display telephone user to receive a new dial tone without releasing the CO line. If the system is installed behind a PBX, Flash allows certain PBX features (such as Transfer) to be accessed.

Conditions:

- (a) Flash parameters must be set for compatibility with the CO or PBX.
- (b) Since Flash provides an interruption in loop current, it is compatible only with loop-start lines.
- (c) Flash cannot be used with single line, one button and four button telephones.

Required Programming:

- C: TMRS (FLSH 100 MS) to program the duration of Flash.

Feature Reference:

Placing a Call

FLEXIBLE NUMBERING PLAN

Description:

Flexible Numbering Plan allows station to port assignments to be changed from the programming terminal. This permits stations to be relocated in a facility, without having to reprogram station options or alter the cabling which connects the stations to the KSU.

Conditions:

- (a) Station features are assigned to station numbers, not ports. If a telephone is moved (or swapped with another), reassigning the ports will enable all of the station features (including the station number) at the new location.
- (b) A port is a fixed location in the KSU.

Required Programming:

P: PORTS to assign stations to ports.

Feature Reference:

Changing the port to station assignment could affect all features that are altered through system or user programming.

FORCED INTERCOM RINGING

Description:

Forced Intercom Ringing causes all Intercom calls to multibutton, display and four button telephones to ring. When Forced Intercom Ringing is enabled, Handsfree Answerback is disabled.

Conditions:

Forced Intercom Ringing can be initiated on a system wide basis from the programming terminal, or individually by the station user.

Required Programming:

F: FLGS (RNG INT CALLS) to enable Forced Intercom Ringing on a system wide basis.

Feature Reference:

Handsfree Answerback
Intercom

HANDSFREE

Description:

Handsfree permits Intercom and CO calls to be placed and answered using the microphone and speaker in the telephone, instead of the handset. All telephones equipped with speakerphones have Handsfree capability.

Conditions:

- (a) Telephones equipped with speakerphones have an HF key.
- (b) Handsfree capability can be selectively denied in system programming. Inhibiting Handsfree in system programming also inhibits Monitor, but has no effect on Handsfree Answerback.

Required Programming:

S: ST OPTS (HF) to allow or deny Handsfree capability to telephones with speakerphones.

Feature Reference:

Handsfree Answerback
Monitor

HANDSFREE ANSWERBACK

Description:

Handsfree Answerback allows Intercom calls to be answered using the speaker and microphone in the telephone, instead of the handset. Intercom calls to four button, multibutton and display telephones are normally received in the Handsfree Answerback mode.

Conditions:

- (a) All multibutton, display and four button telephones have Handsfree Answerback capability.
- (b) If Forced Intercom Ringing is enabled on a system wide basis, Handsfree Answerback is disabled.

Required Programming:

F: FLGS (RNG INT CALLS) to disable Handsfree Answerback.

Feature Reference:

Handsfree
Intercom
Monitor

HOLD

Description:

Hold places an outside call in a temporary waiting condition. There are three types of Hold: I-Hold, Exclusive Hold and Automatic Hold.

I-Hold

Description:

A call put on I-Hold can be picked up at any station in the system. The I-Hold indication is a flashing line key LED. If the call is left on Hold longer than the Hold Recall interval, it will re-ring the station which placed it on Hold. If still unanswered, it will ring at the attendant's station.

Conditions:

- (a) A station must have incoming access to a line in order to pick up a line put on Hold at another station.
- (b) Multibutton and display telephones have a Busy Lamp Field for all lines in the system. This allows users to determine what lines are on I-Hold.
- (c) Single line (2500 type), one button and four button telephones can pick up calls put on Hold at another station; however, the line number must be known.
- (d) A call on Hold re-rings the station that placed it on Hold for a duration equal to the XFER interval.

Required Programming:

- C: TMRS (HLD RCL ST) to program the Hold Recall interval for stations.
- C: TMRS (HLD RCL OP) to program the Hold Recall interval for attendants.
- S: ST OPTS (CO INC) to allow telephones to pick up calls that have been put on Hold at another station.

Feature Reference:

Hold Recall

Exclusive Hold

Description:

A call put on Exclusive Hold can be picked up only at the station which placed the call on Hold. The Exclusive Hold indication is a flashing line key LED at the station which placed the call on Hold, and a steady LED at all other stations in the system. If the call is left on Exclusive Hold longer than the Hold Recall interval, it will change to I-Hold and re-ring the station which placed it on Hold. If still unanswered, it will ring at the attendant's station.

Conditions:

Single line (2500 type), one button and four button telephones cannot put calls on Exclusive Hold.

Required Programming:

- C: TMRS (HLD RCL ST) to program the Hold Recall interval for stations.
- C: TMRS (HLD RCL OP) to program the Hold Recall interval for attendants.

Feature Reference:

Hold Recall

Automatic Hold

Description:

Automatic Hold allows the attendant to answer an outside call, place it on I-Hold and answer another outside call without using the HLD/CNF key. When the attendant presses another line key, the initial call is put on Hold automatically.

Conditions:

- (a) Automatic Hold is available only to the attendant.
- (b) A call placed on Automatic Hold re-rings the attendant after the HLD RCL OP interval, if not retrieved.

Required Programming:

- O: OPRS to assign attendants.
- C: TMRS (HLD RCL OP) to designate the Hold Recall interval for the attendant.

Feature Reference:

Answering a Call
I-Hold

HOLD RECALL

Description:

Hold Recall prevents a call on Hold from being forgotten. The system automatically resignals the station where the call was placed on Hold after a programmed period of time. If the call remains unanswered at the initiating station, it will ring the attendant's station.

Conditions:

- (a) The Hold Recall interval is programmable.
- (b) The Hold Recall interval is also the interval before an unretrieved attendant call on Hold rings at the attendant's station.

Required Programming:

- C: TMRS (HLD RCL ST) to program the Hold Recall interval for stations.
- C: TMRS (HLD RCL OP) to program the Hold Recall interval for attendants.

Feature Reference:

Hold

HOTLINE

Description:

Hotline directly connects two multibutton or display telephones for one button communication and call Transfer. The HL key serves as a DSS key and busy lamp for the Hotline partner. It also can be used to transfer and forward calls to the Hotline partner.

Conditions:

- (a) Single line (2500 type), one button and four button telephones cannot have Hotline partners.
- (b) The Hotline partner can override Do Not Disturb.
- (c) If the attendant station does not have a DSS console assigned to it in programming, the ALT (Alternate) key functions as the HL (Hotline) key.
- (d) The system can accommodate 24 Hotline pairs. A station can have only one Hotline partner.
- (e) The system can be programmed so that stations are part of Hotline groups, rather than assigned to a single Hotline partner.

Required Programming:

S: ST OPTS (HOTLINE) to assign Hotline partners.

Feature Reference:

Do Not Disturb
Intercom
Transfer

INTERCOM

Description:

Intercom enables any station in the system to call any other station in the system. Intercom calls to multibutton, display and four button telephones are normally answered using Handsfree Answerback. If Forced Intercom Ringing is enabled, all Intercom calls will ring and must be answered by lifting the handset.

Conditions:

- (a) Intercom calls can be placed to other stations in the system by dialing the station number, to the attendant by dialing 0, and to the alternate attendant by dialing the alternate's station number.
- (b) If Tenant Service is programmed, stations in one tenant group cannot place Intercom calls to stations in the other tenant group.

Required Programming:

- F: FLGS (RNG INT CALLS) to enable or disable Forced Intercom Ringing on a system wide basis.
- K: TENANTS to program tenant groups.

Feature Reference:

Direct Station Selection

LAST NUMBER REDIAL

Description:

At each station, Last Number Redial stores the last number dialed so that it can be automatically redialed at a later time. The last number dialed is stored in memory regardless of whether the call was answered, unanswered or busy.

Conditions:

- (a) Last Number Redial can redial manually dialed or Speed Dialed calls.
- (b) When using Last Number Redial with four button, one button and single line (2500 type) telephones, F: FLGS (CO SEARCH) permits the system to search for an available line if the line used for the original call is busy.

Required Programming:

F: FLGS (CO SEARCH) to allow four button, one button and single line (2500 type) telephones to use Last Number Redial if the line used for the original call is busy.

Feature Reference:

Placing a Call
Speed Dial

LINE QUEUING

Description:

Line Queuing permits a station to queue (wait in line) for an outside line if it is busy. Any number of stations can queue on a line. The system will call the stations queued, in order, when the line becomes free. If the line is not accessed within 30 seconds after it becomes available, the line passes to the next station in the queue, and the first station must requeue.

Conditions:

- (a) Single line (2500 type) and one button telephones cannot queue for a line.
- (b) A station must be granted outgoing access to a line in order to queue on it.
- (c) Line Queuing is only available on multibutton and four button telephones.
- (d) Every time a line is queued on (Line Queuing), or a message is left (Message Waiting), a system memory element is consumed. The total number of elements consumed (i.e., the sum of lines queued on or messages left) at any one time cannot exceed 128.

Required Programming:

S: ST OPTS (CO OUT) to grant outgoing access to lines.

Feature Reference:

Placing a Call

MESSAGE WAITING

Description:

Message Waiting enables a station user to leave a Message Waiting indication at a called station that is unattended. The Message Waiting indication is a flashing MSG. WAIT (MW/CB) key and a tone. The tone will reoccur 10 seconds after the station goes idle, each time the station goes idle, until the message is answered.

Conditions:

- (a) Single line (2500 type) and one button telephones cannot use the Message Waiting facility.
- (b) A station can leave or receive more than one Message Waiting.
- (c) Messages are queued (in the order in which they are left).
- (d) Message Waiting indications can be canceled at the telephone on which they were left (i.e., the telephone receiving the Message Waiting request).
- (e) Every time a line is queued on (Line Queuing), or a message is left (Message Waiting), a system memory element is consumed. The total number of elements consumed (i.e., the sum of lines queued on or messages left) at any one time cannot exceed 128.

Required Programming: not applicable

Feature Reference:

Callback
Line Queuing

MICROPHONE MUTE

Description:

Microphone Mute allows a multibutton or display telephone user to turn off the microphone while on a Handsfree or Handsfree Answerback call. This prevents the calling party from hearing conversations in the user's office or work area.

Conditions:

- (a) Single line, one button and four button telephones do not have the Microphone Mute feature.
- (b) The attendant (programmed with a DSS console) cannot use Microphone Mute.
- (c) If the attendant station does not have a DSS console assigned to it in programming, the RLS (Release) key functions as the MIC MUTE key.

Required Programming:

S: ST OPTS (TYPE) to program the station as KEY.
O: OPRS to assign attendants and DSS consoles.

Feature Reference:

Handsfree
Handsfree Answerback

MONITOR

Description:

Monitor permits multibutton and four button telephone users to dial and monitor the progress of an outside call without lifting the handset. The handset must be lifted to speak.

Conditions:

- (a) Multibutton telephones without speakerphones (Handsfree) have Monitor capability.
- (b) Single line (2500 type) and one button telephones do not have Monitor capability.

Required Programming:

S: ST OPTS (TYPE) to assign KEY or SLI to telephones with Monitor.

Feature Reference:

Handsfree
Placing a Call

MUSIC ON HOLD / BACKGROUND MUSIC

Description:

Background Music (BGM) and Music on Hold (MOH) can be connected to the system. If installed, BGM is provided through the speaker in the telephone and is controlled by the left volume control thumbwheel. The HLD/CNF key is pressed to turn BGM on and off. BGM can also be broadcast over external paging equipment. On display telephones, the VOL UP and VOL DN keys are used to control the volume of BGM.

Music on Hold (MOH) provides music to outside calls that have been placed on Hold.

Conditions:

- (a) BGM and MOH require the installation of optional music sources. If desired, BGM and MOH can share the same music source.
- (b) If BGM is to be broadcast over external paging equipment, optional paging equipment must be installed.
- (c) Single line (2500 type) and one button telephones cannot broadcast BGM.

Required Programming:

S: ST OPTS (BGM) to allow stations to broadcast BGM.
F: FLGS (MUS ON HLD) to enable the system for Music On Hold.

Feature Reference:

Answering a Call
Hold
Transfer

NIGHT SERVICE

Description:

Assigned Night Answer

Assigned Night Answer (ANA) automatically transfers incoming ringing to specific stations when the system is in the night mode. Stations which do not receive line ringing and incoming access during day hours can be programmed for Assigned Night Answer. Assigned Night Answer must be individually programmed for each station.

Universal Night Answer

When the system is in the night mode, Universal Night Answer (UNA) allows calls which ring the external paging equipment or alerting device to be answered at designated stations. Stations which do not receive line ringing and incoming access during night hours (i.e., ANA) can be programmed for Universal Night Answer. Universal Night Answer must be individually programmed for each line and for each station.

Conditions:

- (a) Only attendants can place the system in the night mode, which activates Universal Night Answer and Assigned Night Answer.
- (b) When more than one incoming CO line is ringing while the system is in the night mode, Universal Night Answer will automatically access the first incoming call.
- (c) Stations have full night mode Split Ringing capability, allowing any combination of audible, incoming access and outgoing access.
- (d) A station may be able to use Universal Night Answer to answer a night mode call heard ringing at another station.

Required Programming:

- L: CO OPTS (UNIV NT ANS) to program lines as UNA lines.
- S: ST OPTS (TYPE) EXT to program external audio ports for night audible.
- S: ST OPTS (CO AUD NT and CO INC NT) to program selected stations for Assigned Night Answer.
- S: ST OPTS (CO OUT NT) to allow stations to place calls when the system is in the night mode.
- S: ST OPTS (UNIV NT ANS) to give individual stations UNA capability.

Feature Reference:

- Answering a Call
- Placing a Call
- Split Ringing

OPX CAPABILITY

Description:

Single line (2500 type) telephones can be installed as Off Premises Extensions (OPXs). Off Premises Extensions have access to all the features available to on-premise single line (2500 type) telephones.

Conditions:

(a) Optional OPX equipment must be installed before OPX telephones can be connected to the system. This equipment consists of a separate KSU with power supply, and a ring generator. Refer to publication P/N 00251 (Appendix F of this manual) for additional details.

(b) An OPX circuit must be ordered from the telco.

Required Programming:

S: ST OPTS (TYPE) to program OPX stations as type 500.

Feature Reference:

OPX telephones can access all the features of single line (2500 type) telephones.

PAGING

Paging, External

Description:

The system allows external audio outputs to be used for External Paging. These outputs are used in conjunction with customer supplied amplifiers and speakers to provide paging capability in areas where Internal Paging is not available or adequate. The External Page outputs are system programmable and can be programmed to broadcast All Call Page, any combination of Internal Zone Page, Night Ring, Day Ring, and/or Background Music.

Conditions:

(a) A system can be programmed with any unused station port as an external audio output (for any combination of Paging, Ringing or Background Music) by entering EXT when programming telephone type.

(b) Refer to Section 6. INSTALLATION OF OPTIONAL EQUIPMENT for installation instructions for external audio outputs.

Required Programming:

S: ST OPTS (TYPE) to designate unused station ports as type EXT.

Feature Reference:

Background Music
Night Service
Paging, Internal
Split Ringing

Paging, Internal

Description

Paging, Internal allows the user to page selected areas (Zone Page), or throughout the entire system (All Call Page). Stations can be individually assigned to receive paging announcements from any combination of All Call Page and the seven Internal Page zones.

Conditions:

(a) Single line (2500 type) and one button telephones cannot receive paging announcements. They can, however, initiate paging announcements.

(b) The system can be programmed to provide a Page beep tone immediately before every paging announcement.

(c) The system can be programmed to deny Page receive to any or all stations.

Required Programming:

F: FLGS (PG RCV BEEP) to enable or disable the Page receive beep.

S: ST OPTS (INT PG) to determine the Page receive configuration for each station.

Feature Reference:

Paging, External

PLACING A CALL

Description:

Any station user has the capability to place any call on any line, unless restrictions have been imposed by system programming. Dialing restrictions may be imposed by Toll Restriction, and outgoing access to specific lines may be denied.

Conditions:

(a) Station users may be required to dial an access code if the system is installed behind a PBX.

(b) If the system is installed in an Equal Access area, special codes may be required to dial outside calls.

Required Programming:

T: TOLL RES. to determine dialing restrictions.

S: ST OPTS (CO OUT) to assign outgoing lines to stations.

L: CO OPTS to program line options.

C: TMRS to program line characteristics.

Feature Reference:

Toll Restriction

PRIVACY

Description:

Privacy prevents an uninvited party from entering a call. Privacy can be overridden only by the attendant using the Barge In feature.

Conditions:

All parties involved in a Barge In will be notified by four Barge In tones, four seconds before the attendant Barges In.

Required Programming: not applicable

Feature Reference:

Barge In

PULSE TO TONE CONVERSION

Description:

A station user can change the dialing mode of the telephone from Dial Pulse (DP) to Dual Tone Multifrequency (DTMF) during the dialing sequence. This facility is useful for systems located in DP areas that use special services which require DTMF digits to place a call. The telephone will revert to the DP mode when the call is completed (i.e., the user hangs up).

Conditions:

- (a) The CO line must be programmed as a DP line.
- (b) DTMF dialing cannot be converted to DP dialing.
- (c) Pulse to Tone Conversion is available to every telephone in the system.
- (d) Pulse to Tone Conversion may also be initiated by Speed Dial numbers which use the directive *38.

Required Programming:

- L: CO OPTS to program lines as DP lines.
- C: TMRS to program DP line parameters.

Feature Reference:

- Placing a Call
- Speed Dial
- Speed Dial Directives

RELEASE

Description:

Release allows the attendant to terminate a call, without replacing the handset, by pressing the RLS key. The Release feature is useful if the attendant is using a customer provided headset or the Handsfree mode to answer and place calls.

Conditions:

(a) Release is a feature reserved for the attendants. The attendant station must have a DSS console assigned to it in programming.

(b) If the attendant station does not have a DSS console assigned in programming, the RLS key functions as the MIC MUTE key.

(c) The attendant telephone must be a multibutton or display telephone.

(d) Release disconnects the line. The attendant can also use the Flash feature if a call is to be made on the same line.

Required Programming:

O: OPRS to assign operators and alternate operators.

Feature Reference:

Answering a Call
Placing a Call

SAVE

Description:

The Save feature permits display telephones to store a frequently called number for automatic dialing at a later time. A saved number remains stored until a new number is saved in its place.

Conditions:

(a) Save is applicable to display telephones only.

(b) Save has no effect on Last Number Redial.

(c) System and Station Speed Dial numbers can be saved.

Required Programming: not applicable

Feature Reference:

Last Number Redial
Placing a Call
Speed Dial, Station
Speed Dial, System

SPEED DIAL, STATION

Description:

Station Speed Dial permits every station in the system to store up to 16 telephone numbers for automatic dialing. Station Speed Dial numbers are stored in station bins; each bin can accommodate up to 16 digits. Bins can be chained (linked together) to allow automatic dialing of numbers longer than 16 digits. Chaining is useful for services such as MCI or SPRINT. In addition, special Speed Dial Directives can be entered into the bins to provide for unique Speed Dial functions.

Conditions:

- (a) A Station Speed Dial bin can be manually chained to a System Speed Dial bin, or to other Station Speed Dial bins.
- (b) Every telephone in the system has access to 16 dedicated Station Speed Dial bins.
- (c) Station Speed Dial bins can be chained to manually dialed numbers.
- (d) Station Speed Dial bins may be used to store Account Codes. This requires that the proper Speed Dial Directives be implemented to designate the Account Codes.
- (e) The line on which the call is to be placed can be pre-selected, and entered into the Station Speed Dial bin.

Required Programming:

- T: TOLL RES. Subfields D, L, R, B, D and P to assign dialing restrictions that may apply to System Speed Dial numbers.
- T: TOLL RES. (J: MISC) to program Class of Service for Speed Dial Directives *81 through *84.
- S: ST OPTS (COS LNE # IS) to determine Class of Service for each line.
- S: ST OPTS (CO OUT) to allow stations outgoing access to lines.

Feature Reference:

- Placing a Call
- Speed Dial Directives

SPEED DIAL, SYSTEM

Description:

System Speed Dial permits every station in the system to access 50 telephone numbers stored by the attendant in System Speed Dial bins. These numbers can be automatically dialed from any station in the system by using a three-digit code. Each bin can accommodate 16 digits; however, system bins may be chained (linked together) to allow automatic dialing of numbers longer than 16 digits. Chaining is useful for services such as MCI or SPRINT. In addition, special Speed Dial Directives may be entered into the bins to provide for unique Speed Dial features.

Conditions:

- (a) Toll Restriction can impose dialing restrictions on System Speed Dial numbers.
- (b) Account Codes, special service access codes and special service security codes can be stored in System Speed Dial bins. Speed Dial directives can be used to designate these codes.
- (c) System Speed Dial bins can be manually or automatically chained together.
- (d) System Speed Dial bins can be manually or automatically chained to Station Speed Dial bins.
- (e) System Speed Dial bins can be chained to manually dialed numbers.
- (f) Line searching should be enabled on a system wide basis, unless dedicated lines are stored along with the numbers in the System Speed Dial bins.
- (g) If a System Speed Dial bin is stored so that it always uses a preselected line, the call will be denied if the preselected line is busy. When the line is free, the call can be placed again. Line Queuing cannot be used to automatically place the call as soon as the line becomes available.

Required Programming:

- G: GRPS to assign a line group as a Speed Dial search group.
- F: FLGS (CO SEARCH) to enable line searching on a system wide basis.
- T: TOLL RES. Subfields D, L, R, B, D and P to assign dialing restrictions that may apply to System Speed Dial numbers.
- J: MISC to program Class of Service for Speed Dial Directives *81 through *84.
- S: ST OPTS (COS LINE # IS) to determine Class of Service for each line.
- S: ST OPTS (CO OUT) to allow stations outgoing access to lines.

Feature Reference:

Placing a Call
Speed Dial Directives
Toll Restriction

SPEED DIAL DIRECTIVES

Speed Dial Directives may be entered into Speed Dial bins to increase the flexibility of Speed Dialing. Each character in the directive is counted as a digit. If a Speed Dial Directive is to be the first entry in a station bin, it must be preceded by an additional *.

Directives *81, *82, *83 and *84 . System Speed Dial COS Restrictions

Description:

The attendant can assign Class of Service restrictions to numbers stored in System Speed Dial bins by using the directives *81, *82, *83 and *84. In Toll Restriction programming, each of these directives is assigned to specific Classes of Service. When the directive is entered into a System Speed Dial bin, only those stations with Classes of Service which are allowed under the specific directive may dial the succeeding digits. All other stations are restricted from using the bin.

For example, if Class of Service 4 is to be the only COS that can dial 12039262000 using System Speed Dial bin 850, program bin 850 with *8112039262000. In T: TOLL RES. (J: MISC) system programming, assign the directive *81 to COS 4 (i.e., 00001000). Stations with Class of Service 4 will be the only stations permitted to use bin 850.

If the directive *81, *82, *83 or *84 is not used in conjunction with the directive *85, dialing restrictions will not be imposed on any digits manually dialed after the bin dials out.

Conditions:

These directives are applicable only to System Speed Dial bins.

Required Programming:

- G: GRPS to assign a line group as a Speed Dial search group.
- F: FLGS (CO SEARCH) to enable line searching on a system wide basis.
- T: TOLL RES. Subfields D, L, R, B, D and P to assign dialing restrictions that may apply to System Speed Dial numbers.
- T: TOLL RES. (J: MISC) to program Class of Service for Speed Dial Directives *81 through *84.
- S: ST OPTS (COS LINE # IS) to determine Class of Service for each line.
- S: ST OPTS (CO OUT) to allow stations outgoing access to lines.

Feature Reference:

Placing a Call
Speed Dial, System
Toll Restriction

Directive *85 - Toll Restriction Restored

Description:

The directive *85 is entered at the end of a System Speed Dial bin if one of the directives, *81, *82, *83 or *84, has been entered at the beginning. The *85 directive turns normal Toll Restriction back on after the System Speed Dial number has dialed out. If the System Speed Dial number is used to access an OCC, the *85 directive assures that normal dialing restrictions will be imposed after the OCC is accessed.

For example, *8119262000 *85 stored in a System bin indicates that only stations with access to the *81 directive can use the bin, and normal Toll Restriction is in force after the bin dials out.

Conditions:

(a) This directive is applicable for System Speed Dial only.

(b) The digits 0 and 1 cannot be manually dialed after a bin containing the directive *85 dials out.

(c) The system imposes "D Table" Class of Service restrictions, programmed in T: TOLL RES. (D: '1+' NNX: COS) after dialing a System Speed Dial bin containing the directive *85.

Required Programming:

- G: GRPS to assign a line group as a Speed Dial search group.
- F: FLGS (CO SEARCH) to enable line searching on a system wide basis.
- T: TOLL RES. Subfields D, L, R, B, D and P to assign dialing restrictions that may apply to System Speed Dial numbers.
- T: TOLL RES. (J: MISC) to program Class of Service for Speed Dial Directives *81 through *84.
- S: ST OPTS (COS LINE = IS) to determine Class of Service for each line.
- S: ST OPTS (CO OUT) to allow stations outgoing access to lines.

Feature Reference:

Placing a Call
Speed Dial, System
Toll Restriction

Directives *86 and *87 - Suppressed Digits

Description:

These directives allow selected digits within a System Speed Dial bin to be suppressed on the telephone display and SMDR printout. The directive *86 denotes the beginning of suppressed digits; *87, the end. This prevents unauthorized access to OCC access codes, account codes, or restricted Speed Dial numbers.

For example, in the bin programmed with 1*869262000*87, the 1 will display and print, the 9262000 will be suppressed.

Conditions:

(a) This directive is for System Speed Dial only.

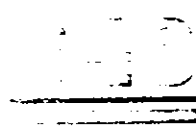
(b) The directives *86 and *87 also suppress the digits normally audible in the telephone receiver or speaker as a System Speed Dial number dials out.

Required Programming:

- G: GRPS to assign a line group as a Speed Dial search group.
- F: FLGS (CO SEARCH) to enable line searching on system wide basis.
- T: TOLL RES. Subfields D, L, R, B, D and P to assign dialing restrictions that may apply to System Speed Dial numbers.
- T: TOLL RES. (J: MISC) to program Class of Service for Speed Dial Directives *81 through *84.
- S: ST OPTS (COS LINE = IS) to determine Class of Service for each line.
- S: ST OPTS (CO OUT) to allow stations outgoing access to lines.

Feature Reference:

Placing a Call
Speed Dial, System
Toll Restriction



Directive *88 - DP to DTMF Conversion

Description:

The *88 directive is used to change the dialing mode of a Speed Dial number from pulse (DP) to tone (DTMF). The digits preceding the *88 are dialed as DP digits. The digits succeeding the *88 are dialed as DTMF digits. This directive is useful if your system is in a DP area and you have OCCs which require DTMF.

For example, when using a bin containing the digits 1203 *889262000, the digits 1203 will be Dial Pulsed and the digits 9262000 will dial out as DTMF tones.

Conditions:

The *88 directive is applicable to both System and Station Speed Dial.

Required Programming:

- C: TMRS to program parameters for DP lines.
- G: GRPS to assign a line group as a Speed Dial search group.
- F: FLGS (CO SEARCH) to enable line searching on a system wide basis.
- T: TOLL RES. Subfields D, L, R, B, D and P to assign dialing restrictions that may apply to System Speed Dial numbers.
- T: TOLL RES. (J: MISC) to program Class of Service for Speed Dial Directives *81 through *84.
- S: ST OPTS (COS LINE ≠ IS) to determine Class of Service for each line.
- S: ST OPTS (CO OUT) to allow stations outgoing access to lines.

Feature Reference:

- Placing a Call
- Pulse to Tone Conversion
- Speed Dial, Station
- Speed Dial, System
- Toll Restriction

Directives *89 and *90

Description:

The directives *89 and *90 are used to designate the beginning and end of Account Codes. These directives assure that Account Codes will not be dialed as digits and will be properly recorded on the SMDR.

For example, a bin programmed with 9262000 *89432 *90 will dial out 9262000 and automatically assign 432 as the Account Code.

Conditions:

- (a) These directives are applicable to System and Station Speed Dial.
- (b) An optional SMDR printer must be connected to the KSU for these directives to be meaningful.

Required Programming:

- C: TMRS to program minimum duration of incoming and outgoing calls to be printed.
- F: FLGS to enable INC, RNA, PBX, LOC, L.D. and BLOCKED fields for the SMDR display.
- G: GRPS to assign a line group as a Speed Dial search group.
- F: FLGS (CO SEARCH) to enable line searching on a system wide basis.
- T: TOLL RES. Subfields D, L, R, B, D and P to assign dialing restrictions that may apply to System Speed Dial numbers.
- T: TOLL RES. (J: MISC) to program Class of Service for Speed Dial Directives *81 through *84.
- S: ST OPTS (COS LINE ≠ IS) to determine Class of Service for each line.
- S: ST OPTS (CO OUT) to allow stations outgoing access to lines.

Feature Reference:

- Placing a Call
- SMDR
- Speed Dial, Station
- Speed Dial, System
- Toll Restriction

*Directives *91 and *92 -*

Display Telephone Microphone Control

Description:

Directive *91 - Display Telephone Microphone Off

If a Speed Dial number will normally be followed by a manually dialed number, enter the directive *91 as the last entry in the bin. This directive turns off the display telephone Handsfree microphone for 15 seconds, assuring correct manual dialing. If the directive *91 is not programmed, background noise through the display telephone microphone may cause the system to misinterpret the actual dialed digits.

2 For example, if the Speed Dial number 926200045451 accesses an Other Common Carrier (OCC), and manual dialing is desired after OCC dial tone is returned, program a bin with 926200045451 *91. When a display telephone uses this bin, the microphone will be muted for 15 seconds after the last digit dials out. This assures correct manual dialing.

Directive *92 - Display Telephone Microphone On

This directive cancels the directive *91. For example, if you wish to chain a station bin ending in *91 to another station bin, program *92 as the first entry in the second bin. The Handsfree microphone will be enabled as soon as the second bin dials out.

For example, assume System Speed Dial bin 850 (containing 926200045451 *91) is to be chained to Station Speed Dial bin 01 (containing *928888000). After bin 850 dials out, the display telephone microphone is turned off. When the system sees the directive *92, the microphone is turned back on as soon as Station Speed Dial bin 01 dials out. If the *92 directive was not entered into station bin 01, the microphone could remain off for as long as ten seconds after bin 01 completed dialing.

Conditions:

These directives are required for display telephones only, and can be used with Station and System Speed Dial.

Required Programming:

- G: GRPS to assign a line group as a Speed Dial search group.
- F: FLGS (CO SEARCH) to enable line searching on a system wide basis.
- F: FLGS (MIC OFF IF DIALING) to automatically turn the display telephone microphone off for six seconds after the last digit is manually dialed.
- T: TOLL RES. Subfields D, L, R, B, D and P to assign dialing restrictions that may apply to System Speed Dial numbers.
- T: TOLL RES. (J: MISC) to program Class of Service for Speed Dial Directives *81 through *84.
- S: ST OPTS (COS LINE # IS) to determine Class of Service for each line.
- S: ST OPTS (CO OUT) to allow stations outgoing access to lines.

Feature Reference:

Placing a Call
Speed Dial, Station
Speed Dial, System
Toll Restriction

Directives *93, *94 and *95 - Pause

Description:

These directives are used to enter pauses into Speed Dial bins. The directive *93 enters one pause; *94 enters two pauses; *95 enters three pauses. The duration of the pause is programmed during system installation.

Pauses may be entered when the system is installed behind a PBX. For example, if the PBX access code for an outside line is 9, and the number to be Speed Dialed is 9262000, program the bin with 9*939262000. The system will pause after the first 9 is dialed, and then continue dialing the rest of the Speed Dial number. The pause may be necessary to allow the PBX time to seize the outside line.

Conditions:

Pauses can be the last entry in a bin only if the bin is always chained to a second bin.

Required Programming:

- C: TMRS (PAUSE) to program the pause duration.
- G: GRPS to assign a line group as a Speed Dial search group.
- F: FLGS (CO SEARCH) to enable line searching on a system wide basis.
- T: TOLL RES. Subfields D, L, R, B, D and P to assign dialing restrictions that may apply to System Speed Dial numbers.
- T: TOLL RES. (J: MISC) to program Class of Service for Speed Dial Directives *81 through *84.
- S: ST OPTS (COS LINE # IS) to determine Class of Service for each line.
- S: ST OPTS (CO OUT) to allow stations outgoing access to lines.

Feature Reference:

- Placing a Call
- Speed Dial, Station
- Speed Dial, System
- Toll Restriction

SPLIT

Description:

Split allows a station user to alternate (split) between two calls that have been placed on Hold. If a station has placed more than two calls on Hold, Split will alternate between the last two calls placed on Hold.

Conditions:

- (a) Split is available to single line (2500 type), one button and four button telephones only.
- (b) If a Split call is left on Hold longer than the Hold Recall interval, it will re-ring at the station which placed it on Hold.

Required Programming:

- C: TMRS (HLD RCL ST) to determine the Hold Recall interval.
- S: ST OPTS (TYPE) must be programmed as SLI or 500.

Feature Reference:

- Hold
- Hold Recall

SPLIT RINGING

Description:

Split Ringing allows CO line ringing and incoming access assignments to be tailored to the requirements of each station. Any combination of lines can ring at a station, and any combination of lines can be answered at a station. Split Ringing is applicable to day mode and night mode operation.

Conditions:

- (a) All incoming calls will cause the line key LEDs to flash, independent of Split Ringing assignments.
- (b) Split ringing is applicable to all telephones in the system.

Required Programming:

S: ST OPTS (CO AUD, CO INC) to program audible and incoming access for lines.

Feature Reference:

Answering a Call
Night Service

STATION MESSAGE DETAIL RECORDING (SMDR)

Description:

Station Message Detail Recording provides a hard copy record of incoming and outgoing calls. SMDR will record the type of call, station number, line number, date, start time of call, duration of the call, time ringing, number dialed, and Account Code (if desired).

Conditions:

- (a) SMDR requires that an optional customer provided printer be connected to the KSU.
- (b) A Real Time Clock Daughter Board, plugged into the B-TGU-B PCB, should be installed for a precise SMDR clock.
- (c) The minimum duration and types of calls that can be printed on the SMDR is determined by system programming.

Required Programming:

C: TMRS

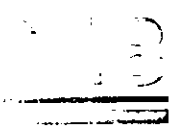
SMDR OTG to determine the minimum duration of outgoing calls that should be printed on the SMDR.
SMDR INC to determine how long an incoming call should ring before being printed as a Ring No Answer (RNA) call. An RNA call is a call that rings into the system and is terminated before an internal party answers it.

F: FLGS

SMDR INC to determine if incoming calls should be printed.
SMDR RNA to determine if RNA calls should be printed.
SMDR PBX to determine if calls to a PBX extension should be printed (if system is installed behind a PBX).
SMDR LOC to determine if local calls should be printed.
SMDR L.D. to determine if long distance calls should be printed.
SMDR BLOCKED to determine if calls blocked due to Toll Restriction should be printed.

Feature Reference:

Answering a Call
Placing a Call
Toll Restriction



TENANT SERVICE

Description:

Tenant Service allows the system to be partitioned into two tenant groups. Each tenant in a two-tenant system has dedicated CO lines, stations and System Speed Dial bins. A separate attendant may be assigned to each tenant. Stations in one tenant group are prevented from accessing lines, stations and System Speed Dial bins in the other tenant group.

Conditions:

Line key LEDs for one tenant will not illuminate on the other tenant's telephones.

Required Programming:

- K: TENANTS to program Tenant Service.
- O: OPRS to program attendants for each tenant group.

Feature Reference:

- Answering a Call
- Intercom
- Placing a Call

TERMINATING A CALL

Description:

Any station user in the system can terminate an active call by hanging up the handset. Multibutton and display telephone users can terminate a Handsfree call by pressing the HF key. Monitored calls can be terminated by pressing the MON key. The attendant can terminate a call by pressing the RLS key.

Conditions: not applicable

Required Programming: not applicable

Feature Reference:

- Answering a Call
- Placing a Call



TOLL RESTRICTION

Description:

Toll Restriction uses a station's Class of Service to impose dialing restrictions on outgoing calls. The system can impose Class of Service restrictions on area codes (NPX codes), office codes (NNX codes), selected restricted numbers, PBX and OCC access codes and System Speed Dial numbers. Toll restriction can be configured for leading 1 calls and non-leading 1 calls, and provides for Equal Access service.

2 Toll restriction can be tailored to the specific needs of the application through completely flexible Class of Service programming. If this degree of flexibility is not required, the system default programming provides for four different Classes of Service (refer to Class of Service).

Conditions:

(a) Ten equal access numbers can be programmed. Eight Classes of Service (1 through 8) and unrestricted dialing (Class of Service 0) can be established.

(b) If Equal Access is to be programmed, the system must be installed in an area that permits the Equal Access facility. Equal Access programming requires that certain access codes be obtained from the local telephone company and the Other Common Carriers.

Required Programming:

- L: CO OPTS to assign lines '10+' dialing type for Equal Access programming.
- T: TOLL RES.
 - D: '1+' NXX: COS to establish NPX and NNX Class of Service assignments for toll calls in leading 1 areas.
 - L: NXX: COS to establish NPX and NNX Class of Service assignments for local calls and non-leading 1 toll calls.
 - R: RES. NOS. to establish restricted numbers.
 - A: '1+' RES. NOS. COS to establish Classes of Service for restricted numbers in leading 1 areas.
 - B: RES. NOS. COS to establish Classes of Service for restricted numbers in non-leading 1 areas.
 - X: PBX CODES to assign PBX access codes.
 - Y: PBX COS to establish Classes of Service for PBX access codes.
 - O: OCC LOC NOS. to designate the OCC access codes.
 - P: OCC EQ. ACCS. NOS to designate equal access services.
 - J: MISC to program directives * 81 through * 84 and various parameters.
- S: ST OPTS (COS LINE # IS) to establish Class of Service on a line by line basis.

Feature Reference:

Placing a Call

TRANSFER

Description:

Transfer allows a station user to transfer a call to another station in the system. There are two types of Transfer: Screened (announced) and Unscreened (unannounced). Unanswered transferred calls automatically revert to the attendant's station.

Conditions:

- (a) All stations in the system can initiate and receive Transfers.
- (b) A station can answer a call and transfer it to another station if the transferring station has access to the line. A station can, however, receive a transferred call to which it would normally be denied access.

Required Programming:

- S: ST OPTS (CO INC. CO OUT. COS LINE # IS) to program access to lines.
- T: TOLL RES. to establish dialing restrictions.

Feature Reference:

- Answering a Call
- Placing a Call
- Toll Restriction

VOLUME CONTROLS

Description:

Two Volume Control thumbwheels are located on the front edge of the multibutton and four button telephones. The left thumbwheel is used to adjust the volume of the Page Receive, Splash Tone, Ring Tone and BGM. The right thumbwheel controls the volume of incoming Handsfree, Handsfree Answerback and Monitor conversations. To increase volume, turn the thumbwheel counterclockwise.

On display telephones, volume is controlled by the VOL UP and VOL DN keys.

On the one button telephone, the single Volume Control regulates the volume of ringing. To increase volume, turn the thumbwheel counterclockwise.

Conditions: not applicable

Required Programming: not applicable

Feature Reference:

- Answering a Call
- Background Music
- Handsfree
- Handsfree Answerback
- Monitor
- Paging



EK-824/1232/1648

ELECTRONIC KEY TELEPHONE SYSTEM
SECTION 3, HARDWARE CONFIGURATION

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1. INTRODUCTION

1.01 The HARDWARE CONFIGURATION Section provides the instructions on how to complete the Order Sheet (Table 3-1), located at the end of this section. The Order Sheet is used to develop a record of the equipment required to meet the needs of the customer.

2. COMPLETING THE ORDER SHEET

TELEPHONES - ITEM 1

2.01 The system can accommodate up to 48 telephone instruments. The available telephones are:

- Multibutton Key Telephone with Speakerphone (Handsfree)
- Multibutton Key Telephone without Speakerphone (Monitor)
- Display Multibutton Key Telephone
- Four Button Key Telephone
- One Button Telephone
- Single line (2500 type) telephone

2.02 Display, multibutton and four button key telephones can be ordered in any combination, up to a maximum of 48. This total is limited by the number of DSS consoles (refer to paragraph 2.05), single line (2500 type) and one button telephones required. If single line (2500 type) or one button telephones are to be used, the available number of key and four button telephones is decreased according to the following chart:

Single Line/One Button Telephones	Maximum Number of Key & Four Button Telephones
1-8	40
9-16	32
17-24	24
25-32	16
33-40	8

2.03 Single line (2500 type) telephones, available as desk or wall models, cannot use standard 90V ringers. These telephones must use either the Special Loud Ringing Tone Board or the TIE Electronic Ringer.

NOTES:

- (a) A Special Loud Ringing Tone Board or a TIE Electronic Ringer must be purchased and installed for each single line (2500 type) telephone ordered. The Special Loud Ringing Tone board has provisions to connect an external ringer for areas where normal ringing is not adequate. In addition, this board allows single line (2500 type) telephones to be ordered with special faceplates containing Hold buttons.
- (b) Single line (2500 type) telephones can be installed as Off Premises Extensions. Optional OPX equipment must be installed before OPX telephones can be connected to the system. This equipment consists of a separate KSU with power supply, and a ring generator. Refer to Appendix F of this manual for additional details.
- (c) Unused station (telephone) positions can be used as audio outputs to broadcast External Page and night audible.

2.04 One Button telephones provide all the features of single line (2500 type) telephones with Hold buttons, and do not require separately purchased ringers.

On Table 3-1, indicate the quantity and type of telephone instruments required. If single line (2500 type) telephones are to be ordered, indicate also how many tone boards, electronic ringers, faceplates with Hold buttons and external ringers are required. If any of the key telephones are to be wall mounted, indicate on Table 3-1 the number of wall mounting kits required.

DSS CONSOLES - ITEM 2

2.05 In order to achieve full use of the attendant's station, it is recommended that one DSS console be ordered for each attendant. If the system has two attendants, two DSS consoles should be ordered. There are two types of DSS consoles: the single port (64 button) and the dual port (56 button). Each single port DSS console requires one station position. Each dual port DSS console requires two station positions.

Indicate on Table 3-1 the number and type of DSS consoles required.

LINES - ITEM 3

2.06 The system can accept up to 16 lines. These lines may be:

- Direct Distance Dialing (DDD) CO Lines
- Wide Area Telephone Service (WATS) CO Lines
- Foreign Exchange (FX) CO Lines
- Lines reserved for SPRINT, MCI, etc.
- Private Branch Exchange (PBX) Lines

Lines can be either Dual Tone Multifrequency (DTMF) or Dial Pulse (DP), in any combination. Keep a record of the lines ordered and the configuration of the RJ21X connector provided by the telco or PBX personnel.

Indicate on Table 3-1 how many of each type of line are required.

NOTE: Combining CO lines and PBX lines in the same system requires additional customer provided equipment and the services of a certified installer.

PRINTED CIRCUIT BOARDS - ITEM 4

Central Processor Unit (B-CPU-B) PCB

2.07 One Central Processor Unit (B-CPU-B) PCB is required in every system. The Central Processor Unit (B-CPU-B) PCB contains Z80 and 6502 microprocessors, system clocks and operating programs (EPROM). The CPU PCB also contains a clock/calendar which can be used for time and date display settings and Station Message Detail Recording (SMDR) purposes; however, it is not battery backed up. A Real Time Clock Daughter Board can be used if accurate battery backed-up time is required. (Refer to paragraph 2.16.)

Station Card Unit (B-8SCU-C) PCB

2.08 Each Station Unit (B-8SCU-C) PCB contains circuits for up to eight key telephones. Up to six B-8SCU-C PCBs can be installed in the EK-1648 KSU, up to four in the EK-1232 KSU, and up to three in the EK-824 KSU. Each PCB contains the required power and receive/transmit circuits for the stations; cross-points for ICM, CO and conference calls; a microprocessor; a Read Only Memory (ROM) program; and overload protection circuits. The PCB position in the KSU determines the port number for the telephone instrument.

2.09 To determine the total number of B-8SCU-C PCBs required:

- (1) Add up the number of display, multibutton and key telephones and audio outputs indicated in Table 3-1, Item 1.
- (2) Combine this figure with the number of ports required to accommodate the DSS consoles ordered in Table 3-1, Item 2.

- (3) Divide the total by 8, and round upward to the next highest whole number (1-6).

For example, if the system requires 10 display telephones, 10 multibutton telephones with speakerphones (Handsfree), and 16 four button telephones, the total is 36. Thirty-six divided by 8 equals 4.5. The total number of B-8SCU-C PCBs required is five.

On Table 3-1, indicate the number of B-8SCU-C PCBs required.

Single Line Instrument (B-8SLU-B) PCB

2.10 The Single Line Instrument Unit (B-8SLU-B) PCB contains circuits for single line (2500 type) and one button telephones. The PCB is installed in place of a Station PCB when single line (2500 type) or one button telephones are used. Each B-8SLU-B PCB can accommodate up to eight single line telephones, but cannot be used with key telephones.

2.11 To determine the total number of B-8SLU-B PCBs required:

- (1) Add up the number of single line (2500 type) and one button telephones indicated in Table 3-1, Item 1.
- (2) Divide this total by 8, and round upward to the next highest whole number (1-5).

For example, if the system requires 8 single line (2500 type) and 4 one button telephones, the total is 12. Twelve divided by 8 is 1.5. The total number of B-8SLU-B PCBs required is two.

On Table 3-1, indicate how many B-8SLU-B PCBs are required.

CO Line Unit (B-4COU-A) PCB

2.12 Each CO Line Unit (B-4COU-A) PCB connects four CO lines to the system. Up to four B-4COU-A PCBs (16 lines) can be installed in the EK-1648 KSU, up to three B-4COU-A PCBs (12 lines) can be installed in the EK-1232 KSU, and up to two B-4COU-A PCBs (8 lines) can be installed in the EK-824 cabinet. This PCB contains ring detectors, conference-enabling circuits, loop relays, and MOH circuitry for each CO line.

2.13 To determine the number of B-4COU-A PCBs required, add up the total number of lines required (Table 3-1, Item 4) and consult the following chart.

Number of Lines Required	Number of B-4COU-A PCBs Required
1-4	1
5-8	2
9-12	3
13-16	4

On Table 3-1, indicate how many B-4COU-A PCBs are required.

Tone Generator Unit (B-TGU-B) PCB

2.14 The Tone Generator Unit (B-TGU-B) PCB generates dial, reorder, Dual Tone Multifrequency (DTMF) and signaling tones for the system. Two Tone Generator PCBs can be installed in an EK-1648 or EK-1232 system; one is required. The EK-824 will accept only one B-TGU-B PCB (refer to paragraph 2.17). Each Tone Generator PCB contains DTMF receivers for tone-to-pulse conversion. The B-TGU-B PCB also contains volume controls for paging, Background Music and Music On Hold (MOH).

2.15 The number of DTMF receivers required depends on system configuration and the intensity of outgoing traffic. The following chart explains when additional DTMF receiver daughter PCBs are required. Note that in a fully loaded system with heavy dialing, a second B-TGU-B PCB is required.

	Number of Stations	Number of Lines	B-TGU-B PCBs Required	Additional DTMF Daughter PCB Req.
Low/Med. dialing	1-24	1-8	1	0
	25-48	9-16	1	1
Heavy dialing	1-36	1-12	1	2
	37-48	13-16	2	1 (4 max.)

NOTE: Display telephone dialing does not require the use of a DTMF receiver on the B-TGU-B. Display telephones should not be counted when determining DTMF receiver requirements.

On Table 3-1, indicate the number of B-TGU-B PCB required. Also indicate if any DTMF Receiver Daughter Boards are required.

2.16 An optional battery backed-up Real Time Clock Daughter Board can be added (for systems with SMDR or display telephones) if battery backed-up exact time and date are required. The integral system clock maintains consistent time but does not have battery back-up. Indicate on Table 3-1 if a Real Time clock Daughter Board is required.

CABINET AND POWER SUPPLY - ITEM 5

2.17 The Key Service Unit (KSU) is the equipment cabinet that houses the PCBs that control the system. The number of telephones and outside lines ordered determines which KSU should be used: the EK-824 KSU, the EK-1232 KSU or the EK-1648 KSU. The following chart explains when each KSU is required. Room for future expansion should always be considered when ordering the KSU.

LINES	TELEPHONES	KSU TO ORDER
1-8	1-24	EK-824
9-12	25-32	EK-1232
13-16	33-48	EK-1648

Indicate on Table 3-1 which KSU is required.

NOTE: Using the EK-824 or EK-1232 KSU requires specific programming and installation considerations. Refer to Section 4, SOFTWARE CONFIGURATION, and Section 5, INSTALLATION, for details.

2.18 The system requires a separate power supply to provide the DC voltages necessary to operate the PCBs. For the EK-1648 KSU, two versions of the power supply are available: the B-PSU-A and the B-PSU-B. Both supplies interact with a thermal protection device in the KSU to prevent overheating of the KSU components. The B-PSU-A power supply will shut down all DC power to the KSU when overheating occurs. The B-PSU-B power supply has a front panel reset button that pops out to indicate that thermal overload is occurring. The B-PSU-B will not shut the system down, and is used when thermal shut down is not desired.

2.19 The EK-824 and EK-1232 KSUs use the B-PSU-E power supply. The supply has the same thermal protection features of the B-PSU-B power supply (i.e., it uses an over-temperature indication instead of thermal shutdown).

Indicate on Table 3-1 which power supply is required.

INSTALLATION HARDWARE - ITEM 6

2.20 The number of station blocks required is determined by the total of B-SSCU-C and B-SSLU-B PCBs ordered, and the number of stations (ports) to be used on each board. In general, the breakdown is as follows:

- PORTS 1-8 - 1 BLOCK
- PORTS 1-20 - 2 BLOCKS
- PORTS 1-32 - 3 BLOCKS
- PORTS 1-44 - 4 BLOCKS
- PORTS 1-48 - 5 BLOCKS

Indicate on Table 3-1 the number of station blocks required.

2.21 One 25-pair cable, with a type 57 male connector on one end and a type 57 female connector on the other, must be ordered to connect the RJ21X to the KSU. This cable cannot exceed 25 feet in length.

2.22 Each station block requires a 25-pair cable to connect it to the KSU. This cable has a type 57 female connector on one end and is unterminated on the other. On Table 3-1, indicate how many of these cables are required.

2.23 Each telephone and DSS console ordered requires a 625A or 625F modular station jack. Indicate on Table 3-1 the number of modular station jacks required.

2.24 Standard quad telephone cable (or equivalent) is used to connect the modular jacks to the station connecting blocks. On Table 3-1, estimate how much quad cable is required.

2.25 The power supply ordered in Item 5 should always be plugged into a surge protector. Indicate on Table 3-1 that a surge protector is required.

OPTIONAL EQUIPMENT - ITEM 7

2.26 A programming terminal with an RS-232-C serial output is required for system installation. This terminal must be plugged into the KSU every time programming is to be changed.

2.27 If a hard copy record of calls is desirable, an SMDR printer is required. Call accounting systems, such as the TIE TELE-RECORD, are also compatible with the system. In many instances the programming terminal doubles as an SMDR printer. On Table 3-1, indicate if an SMDR printer or TIE TELE-RECORD is required.

2.28 Background Music (BGM) and Music On Hold (MOH) require an external music source. BGM and MOH can share the same music source, if desired. Indicate on Table 3-1 if one or two music sources are desired.

2.29 External paging and external Background Music speaker systems may be ordered to provide audible to areas where the levels from the telephone speakers are not adequate. Indicate on Table 3-1 if this type of equipment is desired.

Table 3-1 ORDER SHEET, EK-824/1232/1648 (Page 1 of 2)

ITEM 1: TELEPHONES (*2.01)	
MERITOR/DELPHI Display Multibutton Key Telephone (P/N 86073)	___ required
MERITOR/DELPHI Multibutton Key Telephone with speakerphone (Handsfree) (P/N 86070)	___ required
MERITOR/DELPHI Multibutton Key Telephone without speakerphone (Monitor) (P/N 86072)	___ required
MERITOR/DELPHI Four Button Key Telephone (P/N 86071)	___ required
MERITOR/DELPHI One Button Telephone (P/N 86057)	___ required
ULTRACOM Display Multibutton Key Telephone (P/N 86063)	___ required
ULTRACOM Multibutton Key Telephone with speakerphone (Handsfree) (P/N 86080)	___ required
ULTRACOM Multibutton Key Telephone without speakerphone (Monitor) (P/N 86082)	___ required
ULTRACOM Four Button Key Telephone (P/N 86061)	___ required
ULTRACOM One Button Telephone (P/N 86067)	___ required
Audio Outputs	___ required
Single line (2500) type telephone (desk model)	___ required
Single line (2500) type telephone (wall mount)	___ required
Special Loud Ringing Tone Board (P/N 86185)	___ required
TIE Electronic Ringer (P/N 86187)	___ required
Faceplate with Hold button	___ required
External Ringer	___ required
MERITOR/DELPHI Multibutton Wall Mounting Kit (P/N 86076M)	___ required
MERITOR/DELPHI Four Button/One Button Wall Mounting Kit (P/N 86077M)	___ required
MERITOR/DELPHI Replacement Wall Mount Hanger (P/N 86076A)	___ required
ULTRACOM Multibutton Wall Mounting Kit (P/N 86066)	___ required
ULTRACOM Four Button/One Button Wall Mounting Kit (P/N 86062)	___ required
ITEM 2: DSS CONSOLES (*2.05)	
MERITOR/DELPHI Dual Port DSS Console (P/N 86115)	___ required
MERITOR/DELPHI Single Port DSS Console (P/N 86075)	___ required
ULTRACOM Dual Port DSS Console (P/N 86120)	___ required
ULTRACOM Single Port DSS Console (P/N 86064)	___ required

Item not available from TIE/communications, Inc.

7-3333-1

Table 3-1 ORDER SHEET, EK-824/1232/1648 (Page 2 of 2)

ITEM 3: LINES (*2.06)	
Direct Distance Dialing (DDD) CO lines ¹	___ required
Wide Area Telephone Service (WATS) CO lines ¹	___ required
Foreign Exchange (FX) CO lines ¹	___ required
Special Service (SPRINT, MCI, etc.) CO lines ¹	___ required
Private Branch Exchange (PBX) lines ¹	___ required
ITEM 4: PRINTED CIRCUIT BOARDS (*2.07)	
B-CPU-B PCB (P/N 86114B3)	1 required
B-8SCU-C PCB (P/N 86023)	___ required
B-8SLU-B PCB (P/N 86027/86027A)	___ required
B-4COU-A PCB (P/N 86010)	___ required
B-TGU-B PCB (P/N 86033)	___ required
DTMF Receiver Daughter PCB (P/N 86015)	___ required
Real Time Clock Daughter PCB (P/N 86028)	___ required
ITEM 5: CABINET AND POWER SUPPLY (*2.17)	
EK-1648 KSU (P/N 86100)	___ required
EK-1232 KSU (P/N 86200)	___ required
EK-824 KSU (P/N 84000)	___ required
B-PSU-A Power Supply (P/N 86005A)	___ required
B-PSU-B Power Supply (P/N 86007)	___ required
B-PSU-E Power Supply (P/N 86206)	___ required
ITEM 6: INSTALLATION HARDWARE (*2.20)	
Station connecting block ¹	___ required
25-pair cable, RJ21X to KSU ¹	1 required
25-pair cable, connecting block to KSU ¹	___ required
625A or 625F modular station jack ¹	___ required
Station cable (in feet) ¹	___ required
Surge Protector ¹	1 required
ITEM 7: OPTIONAL EQUIPMENT (*2.26)	
Programming printer/terminal ¹	1 required
SMDR Printer ¹	___ required
External music source ¹	___ required
External paging/BGM equipment ¹	Yes/No

¹Item not available from TIE/communications, Inc.

T1333-1a

EK-824/1232/1648
ELECTRONIC KEY TELEPHONE SYSTEM
SECTION 4, SOFTWARE CONFIGURATION

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 PROGRAM S: ST. OPTS (Station Options) . 4-58

1.02 Each option is explained by headings for Field, Access, Description, Instructions, Example, Default Value, Conditions, Related Programming and Feature Reference. The headings are defined as follows:

Field (Sub-field) presents the prompt for the option exactly as it appears on the printer or terminal.

Access defines the key strokes necessary to access the field.

Description explains how programming the field affects system operation.

Instructions defines how to determine the correct entry, and how to enter it on the Program Record Form.

Example presents a complete sample entry for the field.

Default Value provides the initialized entry for the field.

Conditions establishes the limits of the field, as defined by the system software.

Related Programming lists other fields that interact with the field presented.

Feature Reference lists the features that are affected when the field is programmed.

1. INTRODUCTION

1.01 The SOFTWARE CONFIGURATION Section presents an in-depth analysis of each of the programmable options in the EK-824/1232/1648 Electronic Key Telephone System. Each option is represented by a programming field. As each field is examined, appropriate entries are made on the Program Record Forms. These forms are included at the end of this section. The data base compiled on the Program Record Forms is later entered into system memory during program entry (see Section 7).

PROGRAM I: INITIALIZE

1.03 Each field requires a decimal, hexadecimal or Y(yes)/N(no) entry. For certain fields, 1 and 0 are used to construct binary numbers. These binary numbers must be converted to hexadecimal numbers. Table 4-1 is included for this purpose.

1.04 The system uses menu-driven software. The chart below lists all the system options that can be programmed.

ACCESS KEY	FIELD	DESCRIPTION
I	I: INITIALIZE	Initialize system
D	D: DATE	Set time and date
O	O: OPRS	Program operators and DSS consoles
K	K: TENANTS	Assign tenant groups
C	C: TMRS	Set system timers
F	F: FLGS	Set system flags (options)
G	G: GRPS	Assign memory dial and dial 9 line groups
L	L: CO OPTS	Program line options
E	E: EXT PG	External page outputs - not used
R	R: EXT RLY	Program relays for night ring, etc.
T	T: TOLL RES.	Program Toll Restriction
P	P: PORTS	Station/port assignment
S	S: ST OPTS	Program station options
H	H: HELP	Displays main menu
Z	Z: DONE	Used to exit field or sub-field
CTL-E	ERR	Used to correct error during data entry
ESC.CTL-Q	QUIT	Used to exit programming mode

1.05 The menus and prompts in this section are shown exactly as they appear during programming; however, abbreviated items are detailed in parentheses.

2. DEVELOPING THE PROGRAM RECORD FORM

PROGRAM I: INITIALIZE

Field: I: INITIALIZE

Access:

Press the M key to enter the programming mode. Press the I key to initialize the system.

CAUTION: INITIALIZATION RETURNS ALL FIELDS TO DEFAULT ENTRIES. ALL PREVIOUS PROGRAMMING IS ERASED.

Description:

The system must be initialized in order to set the default (factory installed) program. The system must be initialized prior to programming if for the first time.

Instructions:

Initialization is done at the time of initial programming and does not require an entry on a Program Record Form. Directions for initialization are provided in Section 7, PROGRAM ENTRY.

Example: not applicable

Default Value: not applicable

Conditions: not applicable

Related Programming:

Initialization returns all fields to the default values.

Feature Reference: not applicable

PROGRAM D: DATE

Field: D: DATE

Access:

Press the M key to enter the programming mode. Press the D key to program the date.

Description:

This field allows the correct date to be set. Date information is displayed on display telephones and printed by the SMDR.

Instructions:

The time and date are entered at the time of installation and do not require an entry on a Program Record Form.

Example:

Refer to Section 7. PROGRAM ENTRY.

Default Value: not applicable

Conditions: not applicable

Related Programming: not applicable

Feature Reference:

Date and Time
SMDR

PROGRAM O: OPRS (Operators)

Field: O: OPRS

Access:

Press the M key to enter the programming mode. Press the O key to program O: OPRS. The following sub-fields (shown with their default values) can be programmed:

OP 1 1__
2 PRT DSS (DS1) OP 1 NONE__
2 PRT DSS (DS2) OP 1 NONE__
1 PRT DSS (DS3) OP 1 NONE__
ALT OP 1 NONE__

OP 2 NONE__
2 PRT DSS (DS1) OP 2 NONE__
2 PRT DSS (DS2) OP 2 NONE__
1 PRT DSS (DS3) OP 2 NONE__
ALT OP 2 NONE__

After the first sub-field is programmed, the succeeding sub-field is displayed.

Description:

The system can accommodate two operators, two alternate operators and two DSS consoles. Responses to the prompts for this option determine the station number(s) for the operators, DSS consoles and alternate operators. The DSS consoles can be either single or dual port.

Instructions:

Instructions for compiling data on each sub-field follow.

Example:

Examples for each sub-field follow.

Default Value:

Refer to the sub-fields that follow.

Conditions:

Refer to the sub-fields that follow.

Related Programming:

S: ST OPTS (TYPE) to assign DSS consoles.
P: PORTS to assign consoles and operators to ports.
K: TENANTS to assign lines and stations to each operator in a two-tenant system.

Feature Reference:

Alternate Attendant Station



PROGRAM O: OPRS (OPERATORS)

Sub-Field: OP 1

Access:

OP 1 is the first sub-field displayed when O: OPRS is accessed.

Description:

The OP 1 sub-field determines which station will be the primary system operator. If the system is a two-tenant system, this sub-field determines which station will be the operator for the first tenant.

Instructions:

On Table 4-2, enter the station number (1 through 48) for operator 1. If operator 1 is not assigned, enter N (none).

Example:

If station 301 is to be operator 1, enter 1 for this sub-field on Table 4-2.

Default Value: 1

Conditions:

- (a) Operator 1 must be a Multibutton Key Telephone.
- (b) If OP 1 is for a two-tenant system, the station number assigned must be a member of the first tenant group.

Related Programming:

K: TENANTS to assure that operator 1 is a member of the first tenant group.

Feature Reference:

Tenant Service

Sub-Field: 2 PRT DSS (DS1) OP 1

Access:

This sub-field is displayed after the OP 1 sub-field is programmed.

Description:

Programming this sub-field assigns a station number to the first port of the dual port DSS console for operator 1.

Instructions:

On Table 4-2, enter the station number (1 through 48) for the first port required for the dual port DSS console assigned to operator 1. Enter N (none) if a dual port DSS console is not used.

Example:

If station 336 is to be the first port of the dual port console assigned to operator 1, enter 36 for this sub-field on Table 4-2.

Default Value: NONE

Conditions:

- (a) This sub-field requires a dual port DSS console.
- (b) If the system is configured for two tenants, the DSS console for operator 1 must be in the first tenant group.

Related Programming:

S: ST OPTS (TYPE) to assign the correct telephone type.
K: TENANTS to assure that the console is a member of the first tenant group.

Feature Reference:

Direct Station Selection (DSS)
Tenant Service

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PROGRAM 0: OPRS (OPERATORS)

Sub-Field: 2 PRT DSS (DS2) OP 1

Access:

This sub-field is displayed after the 2 PRT DSS (DS1) OP 1 sub-field is programmed.

Description:

This sub-field assigns a station number to the second port of the dual port DSS console for operator 1.

Instructions:

On Table 4-2, enter the station number (1 through 48) for the second port of the dual port DSS console assigned to operator 1. Enter N (none) if a dual port DSS console is not used.

Example:

If station 337 is to be the second port of the dual port DSS console assigned to operator 1, enter 37 for this sub-field on Table 4-2.

Default Value: NONE

Conditions:

This sub-field requires a dual port DSS console.

Related Programming:

S: ST OPTS (TYPE) to assign the correct telephone type.

Feature Reference:

Direct Station Selection (DSS)
Tenant Service

Sub-Field: 1 PRT DSS (DS3) OP 1

Access:

This sub-field is displayed after the 2 PRT DSS (DS2) OP 1 sub-field is programmed.

Description:

The 1 PRT DSS (DS3) OP 1 sub-field assigns a station number to the single port DSS console for operator 1.

Instructions:

On Table 4-2, enter the station number (1 through 48) for the single port DSS console assigned to operator 1. Enter N (none) if a single port DSS console is not used.

Example:

If station 336 is to be assigned to the single port DSS console for operator 1, enter 36 for this sub-field on Table 4-2.

Default Value: NONE

Conditions:

This sub-field requires a single port DSS console.

Related Programming:

S: ST OPTS (TYPE) to assign correct telephone type.

Feature Reference:

Direct Station Selection (DSS)
Tenant Service



PROGRAM O: OPRS (OPERATORS)

Sub-Field: ALT OP 1

Access:

This sub-field is accessed after the 1 PRT DSS (DS3) OP 1 sub-field is programmed.

Description:

Operator 1 can have another station in the system assigned as its alternate operator. If the operator's station is unattended, all operator calls can be routed to the alternate.

Instructions:

On Table 4-2, enter the station number (1 through 48) for the alternate operator assigned to operator 1. If an alternate is not assigned, enter N (none).

Example:

If station 302 is to be the alternate operator for operator 1, enter 2 for this sub-field on Table 4-2.

Default Value: NONE

Conditions:

The alternate operator must be a multibutton telephone.

Related Programming: not applicable

Feature Reference:

Alternate Attendant Station

Sub-Field: OP 2 NONE__

2 PRT DSS (DS1) OP 2 NONE__

2 PRT DSS (DS2) OP 2 NONE__

1 PRT DSS (DS3) OP 2 NONE__

ALT OP 2 NONE__

Access:

The above sub-fields are accessed after the ALT OP 1 sub-field is programmed.

Description:

All the operator 2 sub-fields are programmed in a similar manner as those for operator 1. However, none of the assignments for operator 2 can duplicate those for operator 1.

Instructions:

Determine the entries for operator 2 as per the instructions for operator 1.

Example:

Refer to OP 1 field.

Default Value:

All sub-fields have default values of NONE.

Conditions:

(a) In a single-tenant system, OP 1 must be programmed before OP 2 will function.

(b) If the second tenant in a two-tenant system is to have an attendant, the station assigned as OP 2 must be in the second tenant group.

Related Programming:

Refer to OP 1 field.

Feature Reference:

Refer to OP 1 field.

PROGRAM K: TENANTS

Field: K: TENANTS

Access:

Press the M key to enter the programming mode. Press the K key to program K: TENANTS.

The following sub-fields (shown with their default values) can be programmed:

TNNT 1 LAST CO 16__

TNNT 1 LAST ST 48__

TNNT 1 LAST BIN 30__

Description:

The system can accommodate two tenants. Responses to the prompts for this option determine the lines, stations and Speed Dial bins available to each tenant. Programming the K: TENANTS option can be done in conjunction with O: OPRS to assign operators to both tenants in a two-tenant system.

Instructions:

For each of the K: TENANTS sub-fields, develop the Program Record Form as indicated.

Example: not applicable

Default Value: not applicable

Conditions: not applicable

Related Programming:

Refer to the sub-fields that follow.

Feature Reference:

Tenant Service

PROGRAM K: TENANTS

Sub-Field: TNNT 1 LAST CO

Access:

Press the M key to enter the programming mode. Press the K key to access the TNNT 1 LAST CO sub-field.

Description:

The TNNT 1 LAST CO sub-field designates the last outside line for the first tenant in a two-tenant system. The first tenant will have access to all lines up to and including the line programmed for this sub-field. If there is no Tenant Service, always leave this sub-field at the default value.

Instructions:

For the TNNT 1 LAST CO sub-field on Table 4-2, enter the number of the last line to be assigned to tenant 1.

Example:

If tenant 1 is to use lines 1 through 8, enter 8 on Table 4-2 for this sub-field.

Default Value: 16

Conditions:

- (a) Tenant line assignments are consecutive.
- (b) When using the EK-824 KSU, it may be helpful to enter 8 as the last line in TNNT 1 LAST CO. Provided the system is not configured for two tenants, this will automatically assign line 8 as the last usable line in the system. When using the EK-1232 KSU, entering 12 will automatically assign line 12 as the last usable line in the system.

Related Programming:

- O: OPRS to determine operator assignments for tenant groups.
- G: GRPS to specify which groups are to be assigned as "dial 9" and Speed Dial groups.
- L: CO OPTS to determine the line options for each group.
- S: ST OPTS to deny audible on lines that are not within a station's tenant group.

Feature Reference:

Tenant Service



PROGRAM K: TENANTS

Sub-Field: TNNT 1 LAST ST

Access:

This sub-field is accessed after the TNNT 1 LAST CO sub-field is programmed.

Description:

Stations can be assigned to either of two tenants in a two-tenant system. This sub-field designates which station will be the last station for tenant group 1. Tenant 1 will consist of all stations up to and including the station assigned in the TNNT 1 LAST ST sub-field. If there is no Tenant Service requirement, always leave this sub-field with the default value.

Instructions:

For the TNNT 1 LAST ST sub-field on Table 4-2, enter the number of the last station for tenant 1.

Example:

If tenant 1 is to use stations 301 through 335, enter 35 for the TNNT 1 LAST ST sub-field on Table 4-2.

Default Value: 48

Conditions:

Tenant assignments use consecutive station numbers.

Related Programming:

- S: ST OPTS to assign options to each station in each tenant group.
- O: OPRS to assure that operator 1 is in tenant group 1.

Feature Reference:

Tenant Service

Sub-Field: TNNT 1 LAST BIN

Access:

This sub-field is accessed after the TNNT 1 LAST ST sub-field is programmed.

Description:

Each tenant in a two-tenant system can have a unique set of System Speed Dial numbers (bins). The entry for this sub-field specifies the last System Speed Dial bin number that can be used by the first tenant in a two-tenant system. If Tenant Service is not implemented, this entry should always be left at the default value.

Instructions:

For this sub-field on Table 4-2, enter the number of the last System Speed Dial bin (31 through 80) that is to be assigned to tenant one of a two-tenant system.

Example:

If tenant one requires 10 System Speed Dial bins, enter 40 on Table 4-2 for the TNNT 1 LAST BIN sub-field.

Default Value: 80

Conditions:

- (a) The System Speed Dial bins assigned to each tenant are always consecutive.
- (b) In order to store System Speed Dial numbers, each tenant in a two-tenant system must have an operator.

Related Programming:

O: OPRS to assign an operator to each tenant.

Feature Reference:

Tenant Service
Speed Dial, System

PROGRAM C: TMRS (TIMERS)

PROGRAM C: TMRS (Timers)

i: C: TMRS

Press the M key to enter the programming mode. Press the key to access C: TMRS.

The following sub-fields (shown with their default values) can be programmed:

- ▷ RCL ST 60__
- ▷ RCL OP 60__
- ▷ SH 100 MS 10__
- ▷ USE 6__
- ▷ ER 30__
- ▷ AL TONE 2__
- ▷ DR OTG 30__
- ▷ DR INC 6__
- ▷ CALL WTG 30__
- ▷ G FRST DIG 15__
- ▷ G SBSQ. DIG 6__
- ▷ BRST 100MS 4__
- ▷ IDLE 100MS 60__
- ▷ IN DRP PLSE 100MS 6__
- ▷ RK MS 61__
- ▷ AKE MS 39__
- ▷ TRDG # PER 10__
- ▷ TMF SPD DIAL 10 MS 6__
- ▷ TMF MAN DIAL 10 MS 12__
- ▷ RV TONE 10__
- ▷ LT OP XFER 30__

Description:

Various timers are used in the system. Each timer is presented as a sub-field in the C: TMRS field.

Instructions:

Use the instructions provided for each timer sub-field to enter a value appropriate for the specific installation requirements.

Example:

Refer to the appropriate C: TMRS sub-field.

Default Value:

Refer to the appropriate C: TMRS sub-field.

Conditions:

Refer to the appropriate C: TMRS sub-field.

Related Programming:

Refer to the appropriate C: TMRS sub-field.

Feature Reference:

Refer to the appropriate C: TMRS sub-field.



PROGRAM C: TMRS (TIMERS)

Sub-Field: HLD RCL ST (*Hold Recall for a Station*)

Access:

Press the M key to enter the programming mode. Press the C key to access the C: TMRS field. The HLD RCL ST sub-field is the first sub-field displayed.

Description:

HLD RCL ST is the elapsed time before a call placed on Hold by a station re-rings at that station.

Instructions:

For this field on Table 4-2, enter the required time in seconds.

Example:

If the HLD RCL ST time is to be 30 seconds, enter 30 for this field on Table 4-2.

Default Value: 60

Conditions:

If HLD RCL ST is set at 00, a station that places a call on Hold will be recalled within six seconds.

Related Programming: not applicable

Feature Reference:

Hold
Hold Recall

Sub-Field: HLD RCL OP
(*Hold Recall for the Operator[s]*)

Access:

This sub-field is displayed after the HLD RCL ST sub-field is programmed.

Description:

HLD RCL OP is the elapsed time before a call placed on Hold by the operator re-rings at the operator's telephone.

Instructions:

On Table 4-2, enter the value for HLD RCL OP in seconds

Example:

If calls that the operator places on Hold should re-ring at the operator's station after 45 seconds, enter 45 for the HLD RCL OP sub-field on Table 4-2.

Default Value: 60

Conditions:

(a) If HLD RCL OP is set at 00, a call that the operator places on Hold will recall the operator within six seconds.

(b) In a system with two operators, the HLD RCL OP sub-field is applicable to both operators.

Related Programming:

O: OPRS to assign system operators.

Feature Reference:

Hold Recall

PROGRAM C: TMRS (TIMERS)

Sub-Field: FLSH 100 MS (Flash Timer)

Access:

This sub-field is accessed after the HLD RCL OP field is programmed.

Description:

The Flash feature can be used to interrupt the loop current on a line. If the line is a CO line, the loop current interruption allows a new dial tone to be obtained without the line being dropped. If the line is a PBX line, certain features (such as Transfer) can be initiated.

Instructions:

On Table 4-2, enter the time (in multiples of 100 milliseconds) that corresponds to the loop current interruption that occurs when the Flash feature is used.

Example:

If the CO line requires an interruption of 2 seconds in order to provide new dial tone, enter 20 on Table 4-2.

Default Value: 10 (1 second)

Conditions:

The FLSH 100 MS time must be compatible with the PBX/Centrex or Central Office.

Related Programming: not applicable

Feature Reference:

Flash

Sub-Field: PAUSE (Pause Time Out)

Access:

This sub-field is accessed after the FLSH 100 MS sub-field is programmed.

Description:

The PAUSE time is the length of the pause inserted into a Speed Dial number when # or *93 is entered into the bin. Pauses are usually required by special dialing services or when the system is installed behind a PBX.

Instructions:

Enter the PAUSE time, in seconds, on Table 4-2.

Example:

If the length of the pause in a Speed Dial Number should be 3 seconds, enter 3 for this sub-field on Table 4-2.

Default Value: 5

Conditions:

This sub-field should be set for compatibility with the line or Other Common Carriers (e.g., MCI or Sprint) to be accessed.

Related Programming: not applicable

Feature Reference:

Speed Dial, Station
Speed Dial, System

PROGRAM C: TMRS (TIMERS)

Sub-Field: XFER (Transfer Recall)

Access:

This sub-field is accessed after the PAUSE sub-field is programmed.

Description:

XFER is the elapsed time before a transferred call returns to the operator (if not picked up at the station to which it was initially transferred).

Instructions:

On Table 4-2, enter the XFER interval in seconds.

Example:

If unanswered transferred calls should re-ring at the operator's station after 30 seconds, enter 30 on Table 4-2.

Default Value: 30

Conditions:

- (a) If the XFER interval is set at 00, a call will recall the operator immediately.
- (b) If a call is left on Hold longer than the Hold Recall interval, it will re-ring the station which placed it on Hold for the XFER interval.

Related Programming: not applicable

Feature Reference:

Transfer

Sub-Field: DIAL TONE

Access:

This sub-field is accessed after the XFER sub-field is programmed.

Description:

DIAL TONE specifies the interval between line seizure and the receipt of dial tone for toll restricted telephones. This timer is used to prevent a user from bypassing the toll restriction by dialing digits before dial tone is provided by the CO. When using an outpulse (DP) line, this timer controls the delay from the time the line is accessed until the internal dial tone is heard. (Since the telephone is isolated from the DP line until dialing is complete, internal dial tone must be provided after the line is initially seized.) Using Speed Dial, this timer controls the interval between the time of bin selection and the time when the digits are sent out.

Instructions:

On Table 4-2, enter the DIAL TONE time in seconds.

Example:

If the DIAL TONE time should be 1 second, enter 1 for this sub-field on Table 4-2.

Default Value: 2

Conditions:

The DIAL TONE sub-fields should be set for compatibility with the PBX/Centrex or Central Office.

Related Programming:

L: CO OPTS (PULSE) to indicate if the line is DP or DTMF.

Feature Reference:

Toll Restriction

PROGRAM C: TMRS (TIMERS)

Sub-Field: SMDR OTG (SMDR Outgoing)

Access:

This sub-field is accessed after the DIAL TONE sub-field is programmed.

Description:

Only outgoing calls of a duration equal to or longer than the SMDR OTG interval are recorded on the SMDR device.

Instructions:

Enter the SMDR OTG time in seconds on Table 4-2.

Example:

If outgoing (OTG) calls lasting at least 60 seconds should be recorded on the SMDR device, enter 60 for this sub-field on Table 4-2.

Default Value: 30

Conditions: not applicable

Related Programming:

F: FLGS (SMDR INC, RNA, PBX, LOC, L.D., BLCKED) to determine the parameters for SMDR.

Feature Reference:

SMDR

Sub-Field: SMDR INC (SMDR Incoming)

Access:

This sub-field is accessed after the SMDR OTG sub-field is programmed.

Description:

Incoming calls ringing for a duration equal to or longer than the SMDR INC time interval are recorded on the SMDR device as Ring No Answer (RNA) calls. The printout will occur after the ringing stops.

Instructions:

On Table 4-2, enter the time interval in seconds that determines which unanswered incoming calls should be recorded as RNA calls.

Example:

If all calls ringing for 5 seconds or longer should be recorded as Ring No Answer calls, enter 5 for the SMDR INC sub-field of Table 4-2.

Default Value: 6

Conditions: not applicable

Related Programming:

C: TMRS (SMDR OTG) to determine the minimum duration of outgoing (OTG) calls that will be printed on the SMDR.

F: FLGS (SMDR RNA) to determine if RNA calls should be recorded.

Feature Reference:

SMDR

PROGRAM C: TMRS (TIMERS)

Sub-Field: CO CALL WTG (CO Call Waiting)

Access:

This sub-field is accessed after the SMDR INC sub-field is programmed.

Description:

The CO CALL WTG sub-field sets the interval between the Call Waiting tones used to indicate that an outside call is waiting to be answered.

Instructions:

For the CO CALL WTG sub-field on Table 4-2, enter the time in seconds that specifies the interval between CO Call Waiting tones.

Example:

If CO Call Waiting tones should be heard every 20 seconds, enter 20 on Table 4-2.

Default Value: 30

Conditions:

CO Call Waiting must also be enabled on a station-by-station and system basis.

Related Programming:

- S: ST OPTS (CO CALL WTG) to enable each station individually for CO Call Waiting.
- F: FLGS (CO CALL WT) to enable the system for CO Call Waiting tones.

Feature Reference:

Call Waiting

Sub-Field: REG FRST DIG (Register First Digit)

Access:

This sub-field is accessed after the CO CALL WTG sub-field is programmed.

Description:

The REG FRST DIG sub-field sets the maximum allowable interval between line seizure and the first digit dialed when placing a call.

After a line is accessed, the system assigns a DTMF receiver to the line and waits a specified time for the first digit to be dialed. This is the REG FRST DIG interval. If the first digit is not dialed within the specified interval, the DTMF receiver is disconnected from the line and is made available to other stations. In addition, the dial pad on a toll restricted telephone is turned off. The initial call must be placed again.

Instructions:

On Table 4-2, enter the time in seconds that the system should wait for the first digit to be dialed, once the line is seized.

Example:

If the first digit should be dialed within 3 seconds, enter 3 on Table 4-2.

Default Value: 15

PROGRAM C: TMRS (TIMERS)

Conditions:

- (a) The DTMF receiver is used for SMDR, Last Number Redial, Toll Restriction and pulse (DP) dialing. When the interval is exceeded, these facilities are disabled.
- (b) If the REG FRST DIG interval is set at 00, the DTMF receiver is disconnected from the line as soon as the line is seized. Also, the dial pad on a toll restricted telephone is turned off as soon as a line is seized.
- (c) Since the DTMF Central Office (or PBX) is responsible for providing dial tone, the system will assign a DTMF receiver as soon as the line is seized, even if dial tone is not received.
- (d) If the DIAL TONE interval is set longer than the REG FRST DIG interval, dialing will be prevented from Toll Restricted telephones.

Related Programming:

- C: TMRS (DIAL TONE) to assure that the DIAL TONE interval is shorter than the REG FRST DIG interval.
- C: TMRS (REG SBSQ. DIG) to program the interval allowed between each of the succeeding digits.

Feature Reference:

Last Number Redial
Placing a Call
SMDR
Toll Restriction

Sub-Field: REG SBSQ. DIG (Register Subsequent Digits)

Access:

This sub-field is accessed after the REG FRST DIG sub-field is programmed.

Description:

The REG SBSQ DIG sub-field sets the maximum allowable interval between each of the numbers dialed when placing a call. After a digit is dialed, the system waits a specified interval for the next digit to be dialed. If the next digit is not dialed within this interval, the DTMF receiver is removed from the line and made available to other stations in the system. The call must be placed again. The REG SBSQ. DIG interval applies to all of the subsequent digits in a dialed number.

Instructions:

On Table 4-2, enter the REG SBSQ. DIG interval in seconds.

Example:

If the system should wait 3 seconds between each digit dialed (before disconnecting the DTMF receiver from the call), enter 3 on Table 4-2.

Default Value: 6

Conditions:

(a) The DTMF receiver is used for SMDR, Last Number Redial, Toll Restriction and pulse (DP) dialing. When the interval is exceeded, these facilities are disabled.

(b) If the REG SBSQ. DIG interval is set at 00, the DTMF receiver is disconnected from the line as soon as the first digit is dialed. Additionally, the dial pad on a toll restricted telephone is turned off as soon as the first digit is dialed.

Related Programming:

C: TMRS (REG FRST DIG) to program the first digit interval.

Feature Reference:

Last Number Redial
Placing a Call
SMDR
Toll Restriction

PROGRAM C: TMRS (TIMERS)

Sub-Field: MIN RNG BRST 100MS
(Minimum Ring Burst)

Access:

This sub-field is accessed after the REG SBSQ. DIG sub-field is accessed.

Description:

MIN RNG BRST 100MS is the minimum incoming call ring burst required in order to cause a ring detect. Ring bursts of a duration less than the time programmed in this sub-field will not be detected. This would prevent the call from ringing into the system.

Instructions:

For this sub-field on Table 4-2, enter the value required. The entry is multiplied by 100 milliseconds (e.g., 1 = 100 mS).

Example:

If the incoming lines provide a ring burst of 600 mS, enter 6 to insure that the system is compatible with the lines connected to it.

Default Value: 4

Conditions:

The system should be set to match the parameters of the lines to which it is connected. This sub-field pertains to all lines.

Related Programming:

- C: TMRS (MAX RNG IDLE 100MS) to program the maximum interval between ring bursts.
- L: CO OPTS to assign the correct options to the line being programmed.

Feature Reference:

Answering a Call

Sub-Field: MAX RNG IDLE 100MS
(Maximum Ring Idle)

Access:

This sub-field is accessed after the MIN RNG BRST 100MS sub-field is programmed.

Description:

MAX RNG IDLE 100MS is the maximum interval between ring bursts. If the next ring burst occurs before the MAX RNG IDLE 100MS time, the call will continue to ring into the system. If the ring burst does not occur before the time set by this sub-field, the system knows that the calling party has hung up.

Instructions:

On Table 4-2, enter the interval required for compatibility with the incoming lines. The entry is in multiples of 100 mS (e.g., 1 = 100 mS).

Example:

If calls should be dropped after a ring idle time of 8 seconds, enter 80 for this sub-field on Table 4-2.

Default Value: 60

Conditions:

The system must match the parameters of the lines to which it is connected.

Related Programming:

- C: TMRS (MIN RNG BRST 100MS) to program the minimum incoming call ring burst.
- L: CO OPTS to assign the correct options to the line being programmed.

Feature Reference:

Answering a Call

PROGRAM C: TMRS (TIMERS)

Sub-Field: MIN DRP PLSE 100MS

Access:

This sub-field is accessed after the MAX RNG IDLE 100MS sub-field is programmed.

Description:

The Central Office sends an interruption in loop current to the system which indicates that the call placed on Hold has been abandoned by the outside party. This sub-field matches the requirements of the system to the duration of the pulse sent by the CO.

Instructions:

On Table 4-2, enter the value of the drop pulse that is compatible with the Central Office. The entry is a multiple of 100 mS (e.g., 4 = 400 mS).

Example:

If the CO provides a drop pulse of at least 400 mS to indicate that a call on Hold has been abandoned, enter 4 on Table 4-2.

Default Value: 6

Conditions:

The system must be matched to the requirements of the Central Office.

Related Programming:

F: FLGS (CO DRP ENA) to allow the system to detect the drop pulse sent from the CO.

Feature Reference:

Hold

Sub-Field: BRK MS (Break)

Access:

This sub-field is accessed after the MIN DRP PLSE 100MS sub-field is programmed.

Description:

Each digit dialed during Dial Pulsing consists of a specific make (loop relay closed) and break (loop relay open) time. The BRK MS sub-field determines the time in milliseconds that the relay remains open during the Dial Pulsing of a digit.

Instructions:

On Table 4-2, enter the value for this sub-field in milliseconds.

Example:

If the Dial Pulse break time required by the Central Office is 75 mS, enter 75 on Table 4-2.

Default Value: 61

Conditions:

The value entered for this sub-field must be compatible with the requirements of the Central Office.

Related Programming:

- C: TMRS (MAKE MS) to set the Dial Pulse make interval to be compatible with the line.
- C: TMRS (INTRDG = PER) to set the interdigit time between Dial Pulse digits.

Feature Reference:

Placing a Call

PROGRAM C: TMRS (TIMERS)

Sub-Field: MAKE MS

Access:

This sub-field is accessed after the BRK MS sub-field is programmed.

Description:

This sub-field determines how long the loop relay will remain closed when dialing a Dial Pulse digit.

Instructions:

On Table 4-2, enter the MAKE MS interval required by the Central Office. The entry is in milliseconds.

Example:

If the Central Office expects to receive a Dial Pulsed digit with a make (loop relay closed) time of 44 mS, enter 44 for this sub-field on Table 4-2.

Default Value: 39

Conditions:

This sub-field must be programmed for compatibility with the Central Office.

Related Programming:

C: TMRS (BRK MS) to program the Dial Pulse break interval.

C: TMRS (INTRDG # PER) to set the interdigit time between Dial Pulse digits.

Feature Reference:

Placing a Call

Sub-Field: INTRDG # PER (Interdigit Time)

Access:

This sub-field is accessed after the MAKE MS sub-field is programmed.

Description:

Each digit in Dial Pulse dialing is separated by a quiet (waiting) interval. This interval tells the Central Office that a digit has been dialed and another is about to be transmitted. The INTRDG # PER sub-field determines the duration of the quiet interval between dialed digits.

Instructions:

Each pulse in a Dial Pulse digit consists of the Make and Break time. The sum of the Make and Break time is the Pulse Period. The quiet time (INTRDG # PER interval) between the Dial Pulse digits is a specified number of Pulse Periods. On Table 4-2, enter the number of Pulse Periods required by the Central Office between Dial Pulse digits. The entry is in Pulse Periods.

Example:

If the Central Office requires 8 pulse periods between digits, enter 8 for this sub-field on Table 4-2.

Default Value: 10

Conditions:

The entry for this sub-field is determined by the requirements of the Central Office.

Related Programming:

C: TMRS (BRK MS) to set the Dial Pulse break duration.

C: TMRS (MAKE MS) to set the Dial Pulse make duration.

Feature Reference:

Placing a Call

PROGRAM C: TMRS (TIMERS)

Sub-Field: DTMF SPD DIAL 10 MS

Access:

This sub-field is accessed after the ENTRDG = PER sub-field is programmed.

Description:

The DTMF SPD DIAL 10 MS sub-field determines the duration of the tones that correspond to each digit produced during Dual Tone Multifrequency (DTMF) speed dialing.

Instructions:

On Table 4-2, enter the duration of DTMF digits required. The entry is in multiples of 10 mS (e.g., 4 = 40 mS).

Example:

If the Central Office requires DTMF digits that are 40 mS in duration, enter 4 on Table 4-2 for this sub-field.

Default Value: 6

Conditions:

This entry is determined by the requirements of the Central Office.

Related Programming:

- C: TMRS (DTMF MAN DIAL 10 MS) to insure that manual and Speed Dial parameters are the same.
- L: CO OPTS to program line options.

Feature Reference:

- Placing a Call
- Speed Dial, Station
- Speed Dial, System

Sub-Field: DTMF MAN DIAL 10 MS

Access:

This sub-field is accessed after the DTMF SPD DIAL 10 MS sub-field is programmed.

Description:

This sub-field is identical to the DTMF SPD DIAL 10 MS sub-field except that it is only relevant to manual dialing on display telephones. All other DTMF telephones in the system use DTMF dials (and the duration of the DTMF manually dialed digits is determined by how long the user presses the dial pad key).

Instructions:

On Table 4-2, enter the time which determines the duration of DTMF tones produced when manually dialing on a display telephone. The entry is in multiples of 10 milliseconds (e.g., 4 = 40 mS).

Example:

If the Central Office requires that each DTMF digit dialed on a display telephone should be 100 mS long, enter 10 on Table 4-2.

Default Value: 12

Conditions:

The entry for this sub-field should match the requirements of the Central Office.

Related Programming:

- C: TMRS (DTMF SPD DIAL 10 MS) to insure that Speed Dial and manual dial use the same parameters.

Feature Reference:

- Placing a Call

PROGRAM C: TMRS (TIMERS)

Sub-Field: PRV TONE (Alert Tone/Privacy Tone)

Access:

This sub-field is accessed after the DTMF MAN DIAL 10 MS sub-field is programmed.

Description:

If a telephone receives a Handsfree Intercom call (or a Barge In call), it can be programmed to broadcast a Privacy Tone. This tone indicates to the user that a Handsfree link (or Barge In) is still established with another station in the system. The Privacy Tone is a 300 mS tone. The PRV TONE sub-field establishes the interval between the Privacy Tones, on a system wide basis.

Instructions:

On Table 4-2, enter the interval in seconds that will separate Privacy Tones.

Example:

If the system should have privacy tones every minute, enter 60 on Table 4-2 for this sub-field.

Default Value: 10

Conditions: not applicable

Related Programming:

F: FLGS (PRV TONES) to enable the system for Privacy Tones.

Feature Reference:

Barge In
Handsfree Answerback
Privacy Tone

Sub-Field: ALT OP XFER

Access:

This sub-field is accessed after the PRV TONE sub-field is programmed.

Description:

If the system is configured with an Alternate Attendant, ALT OP XFER designates the time after which calls unanswered by the Attendant will ring at the Alternate Attendant.

Instructions:

On Table 4-2, enter the ALT OP XFER time in seconds.

Example:

If unanswered Attendant calls should ring at the Alternate Attendant Station after 1 minute, enter 60 for this sub-field on Table 4-2.

Default Value: 30

Conditions:

If the ALT OP XFER interval is set at 00, calls which ring at the operator's station will ring the alternate operator simultaneously.

Related Programming:

O: OPRS (ALT OP) to assign the alternate operator(s).
S: ST OPTS (CO AUD) to enable audible (ringing) for the attendant(s).

Feature Reference:

Alternate Attendant Station
Answering a Call

PROGRAM F: FLGS (FLAGS)

PROGRAM F: FLGS (Flags)

Field: F: FLGS (Flags)

Access:

Press the M key to enter the programming mode. Press the F key to display the first sub-field in F: FLGS.

The following sub-fields (shown with their default values) can be programmed:

MUS ON HLD NO__
OP 1 BRG IN NO__
OP 2 BRG IN NO__
DYLT SVGS ADJ YES__
SLI CO/INT RNG NO__
CO DRP ENA NO__
CO CALL WT YES__
OP 1 INT CALL WT YES__
OP 2 INT CALL WT YES__
CO SEARCH YES__
RNG INT CALLS NO__
SMDR INC YES__
SMDR RNA YES__
SMDR PBX YES__
SMDR LOC YES__
SMDR L.D. YES__
SMDR BLCKED YES__
PG RCV BEEP YES__
PRV TONES NO__
TCX-128 KSU NO__
MIC OFF IF DIALING YES__

Description:

The F: FLGS field consists of various options (flags) that can be enabled or disabled on a system wide basis. Although each flag has a default value, programming the field is useful when customizing the system to a specific installation.

Instructions:

Refer to the sub-fields that follow.

Example:

Refer to the sub-fields that follow.

Default Value:

Refer to the sub-fields that follow.

Conditions:

Refer to the sub-fields that follow.

Related Programming:

Refer to the sub-fields that follow.

Feature Reference:

Refer to the sub-fields that follow.

PROGRAM F: FLGS (FLAGS)

Sub-Field: MUS ON HLD (Music on Hold)

Access:

Press the M key to enter the programming mode. Press the F key to access the first sub-field of F: FLGS (MUS ON HLD).

Description:

If the system is equipped with an optional music source, callers on Hold can receive Music on Hold.

Instructions:

On Table 4-2, enter Y if callers on Hold should receive Music on Hold; N if they should not.

Example: not applicable

Default Value: NO

Conditions:

An external music source must be installed.

Related Programming: not applicable

Feature Reference:

Music on Hold/Background Music

Sub-Field: OP 1 BRG IN (Operator 1 Barge In)

Access:

This sub-field is accessed after the MUS ON HLD sub-field is programmed.

Description:

If this option is enabled, operator 1 has the ability to Barge In (intrude into) calls in progress.

Instructions:

On Table 4-2, enter Y if operator 1 is to be able to Barge In; N if not.

Example: not applicable

Default Value: NO

Conditions:

Barge In receive must also be granted on a station-by-station basis.

Related Programming:

O: OPRS to assign operators.

S: ST OPTS (RCV BRG IN) to restrict/enable Barge In on a station-by-station basis.

Feature Reference:

Barge In

PROGRAM F: FLGS (FLAGS)

Sub-Field: OP 2 BRG IN (Operator 2 Barge In)

Access:

This sub-field is accessed after the OP 1 BRG IN sub-field is programmed.

Description:

The OP 2 BRG IN flag, if enabled, allows operator 2 to Barge In (interrupt) calls in progress.

Instructions:

If operator 2 is to be able to Barge In, enter Y on Table 4-2; N if not.

Example: not applicable

Default Value: NO

Conditions:

Barge In receive must be granted on a station-by-station basis.

Related Programming:

- O: OPRS to assign operators.
- S: ST OPTS (RCV BRG IN) to restrict/enable Barge In receive on a station-by-station basis.

Feature Reference:

Barge In

Sub-Field: DYLT SVGS ADJ (Daylight Savings Adjust)

This sub-field appears after the OP 2 BRG IN sub-field only if a Real Time Clock Daughter Board is installed.

CAUTION: THIS SUB-FIELD IS CURRENTLY NOT USED. DO NOT ATTEMPT TO CHANGE THE DEFAULT VALUE.

PROGRAM F: FLGS (FLAGS)

Sub-Field: SLI CO/INT RNG (Distinctive Ringing)

Access:

This sub-field is accessed after the preceding sub-field (OP 2 BRG IN or DYLT SVGS ADJ) is programmed.

Description:

Distinctive ringing allows users of single line telephones to differentiate between Intercom and outside calls. If this flag is enabled, outside calls will ring with two short ring bursts followed by a 4.5 second pause; Intercom calls will ring with a 1.5 second burst followed by a 4.5 second pause.

Instructions:

On Table 4-2, enter Y if distinctive ringing for single line telephones is desired; N if not.

Example: not applicable

Default Value: NO

Conditions:

This flag pertains only to single line (2500 type) and one button telephones.

Related Programming:

S: ST OPTS (TYPE) to designate the telephone type.

Feature Reference:

Answering a Call
Distinctive Ringing

Sub-Field: CO DRP ENA

Access:

This sub-field is accessed after the SLI CO INT RNG sub-field is programmed.

Description:

The system has the ability to drop a call that a system user has placed on Hold, but has been abandoned by the outside party. If the CO DRP ENA option is enabled, the line abandoned is released and is made available to another user.

Instructions:

If the system should be able to drop abandoned calls on Hold, enter Y on Table 4-2; N if not.

Example: not applicable

Default Value: NO

Conditions:

This sub-field is meaningful for both DTMF and Dial Pulse lines, and only for calls on Hold.

Related Programming:

C: TMRS (MIN DRP PLSE 100 MS) to make the sys compatible with the drop pulse being sent from the ()
L: CO OPTS to assign correct line parameters.

Feature Reference:

Hold

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PROGRAM F: FLGS (FLAGS)

Sub-Field: CO CALL WT

Access:

This sub-field is accessed after the CO DRP ENA sub-field is programmed.

Description:

Outside Call Waiting alerts a user, busy on a call, that another outside call is waiting to be answered. If enabled, this flag permits Outside Call Waiting tones on a system wide basis.

Instructions:

If the system should have Outside Call Waiting tones, enter Y on Table 4-2; N if not.

Example: not applicable

Default Value: YES

Conditions:

(a) If this flag is enabled, Outside Call Waiting tones must also be enabled on a station-by-station basis. This flag does not apply for Internal Call Waiting signals.

(b) Stations can receive Outside Call Waiting tones only from lines for which S: ST OPTS (CO AUD) is granted.

Related Programming:

S: ST OPTS (CO CALL WTG) to enable CO Call Waiting on a station-by-station basis.

S: ST OPTS (CO AUD) to enable audible (ringing) for lines.

Feature Reference:

Answering a Call
Call Waiting, CO Call

Sub-Field: OP 1 INT CALL WT

Access:

This sub-field is accessed after the CO CALL WT sub-field is programmed.

Description:

The system can be configured to selectively deny Internal Call Waiting tones to operator 1. If this flag is disabled, operator 1 cannot receive any Internal Call Waiting tones.

Instructions:

On Table 4-2, enter Y if operator 1 is to receive Internal Call Waiting tones; N if not.

Example: not applicable

Default Value: YES

Conditions:

(a) This sub-field has no effect on Outside Call Waiting tones for operator 1.

(b) Internal Call Waiting to operator 1 is not enabled in S: ST OPTS (INT CALL WTG).

Related Programming:

O: OPRS to assign operators.

Feature Reference:

Call Waiting, Internal

PROGRAM F: FLGS (FLAGS)

Sub-Field: OP 2 INT CALL WT

Access:

This sub-field is accessed after the OP 1 INT CALL WT sub-field is programmed.

Description:

The system can be configured to selectively deny Internal Call Waiting tones to operator 2. If this flag is disabled, operator 2 cannot receive any Internal Call Waiting tones.

Instructions:

If operator 2 is to receive Internal Call Waiting tones, enter Y on Table 4-2; N if not.

Example: not applicable

Default Value: YES

Conditions:

(a) This sub-field has no effect on Outside Call Waiting tones for operator 2.

(b) Internal Call Waiting to operator 2 is not enabled in S: ST OPTS (INT CALL WTG).

Related Programming:

O: OPRS to assign operators.

Feature Reference:

Call Waiting, Internal

Sub-Field: CO SEARCH

Access:

This sub-field is accessed after the OP 2 INT CALL WT sub-field is programmed.

Description:

The CO SEARCH flag, if enabled, allows stations to search for the first available line in the specified Speed Dial line group (MEM DIAL GRP) when using System Speed Dial (e.g., dialing 831-880). This flag also allows single line (2500 type), one button and four button telephones to search for an available outgoing line in the Dial 9 line group (i.e., by dialing 9) and to search for a line when using Station Speed Dial (i.e., dialing 801-816).

If the CO SEARCH flag is disabled:

- (a) Single line (2500 type), one button and four button telephones cannot search for an available line by dialing 9 or when using Station Speed Dial bins (i.e., dialing 801-816).
- (b) System Speed Dial numbers can be accessed only if a specific line is stored in the System Speed Dial bin.

Instructions:

On Table 4-2, enter Y if CO SEARCH should be allowed, if not.

Example: not applicable

Default Value: YES

PROGRAM F: FLGS (FLAGS)

Conditions:

(a) Single line, one button and four button telephones have lines preselected as part of the Station Speed Dial number. If the preselected line is busy when the Station Speed Dial number is accessed (801-816), CO SEARCH will allow the system to search for an available line in the same line group.

(b) When using Last Number Redial with four button, one button and single line (2500 type) telephones, CO SEARCH permits the system to search for an available line if the line used for the original call is busy. The system will search only the line group in which the line used for the original call resides.

Related Programming:

G: GRPS (MEM DIAL GRP) to designate the search groups.

S: ST OPTS to give access to the lines in the search groups.

Feature Reference:

Last Number Redial
Placing a Call
Speed Dial System

Sub-Field: RNG INT CALLS

Access:

This sub-field is accessed after the CO SEARCH sub-field is programmed.

Description:

If enabled, the RNG INT CALLS flag forces all Intercom calls to ring, rather than be voice announced.

Instructions:

On Table 4-2, enter Y if all Intercom calls should ring; N if voice announced calls are permitted.

Example: not applicable

Default Value: NO

Conditions:

If this option is disabled, each telephone user can select the mode (ring vs. voice announce) of each Intercom call placed.

Related Programming: not applicable

Feature Reference:

Forced Intercom Ringing
Handsfree Answerback
Intercom

PROGRAM F: FLGS (FLAGS)

Sub-Field: SMDR INC

Access:

This sub-field is accessed after the RNG INT CALLS sub-field is programmed.

Description:

If disabled, this option excludes answered incoming calls from the SMDR call record. If enabled, answered incoming calls will be recorded.

Instructions:

On Table 4-2, enter Y if incoming calls should be recorded; N if not.

Example: not applicable

Default Value: YES

Conditions:

This option is meaningful only if an SMDR device is installed.

Related Programming:

C: TMRS (SMDR INC) to set the minimum duration of an incoming RNA call.

Feature Reference:

Answering a Call
SMDR

Sub-Field: SMDR RNA

Access:

This sub-field is accessed after the SMDR INC sub-field is programmed.

Description:

If enabled, this flag allows unanswered incoming calls (Ring No Answer) to be printed on the SMDR display. If disabled, Ring No Answer calls will not be printed.

Instructions:

On Table 4-2, enter Y if Ring No Answer calls should be printed on the SMDR; N if not.

Example: not applicable

Default Value: YES

Conditions:

If enabled, this sub-field requires that an SMDR device be installed.

Related Programming:

C: TMRS (SMDR INC) to program the length of time incoming call must ring before it can be printed as a Ring No Answer (RNA) call.

Feature Reference:

Answering a Call
SMDR

PROGRAM F: FLGS (FLAGS)

Sub-Field: SMDR PBX

Access:

This sub-field is accessed after the SMDR RNA sub-field is programmed.

Description:

If the system is installed behind a Private Branch Exchange (PBX), this option allows outgoing PBX calls (calls to a PBX extension) to be printed on the SMDR device. If disabled, outgoing PBX calls are not printed.

Instructions:

Enter Y on Table 4-2 if outgoing PBX calls are to be recorded; N if not.

Example: not applicable

Default Value: YES

Conditions:

- (a) This sub-field is meaningful only if the system is installed behind a PBX.
- (b) The system defines a call to a PBX extension as any call not preceded by a PBX access code.

Related Programming:

- L: CO OPTS (BEHIND PBX) to indicate if the line is installed behind a PBX.
- T: TOLL RES. (X: PBX CODES) to assign PBX access codes.
- T: TOLL RES. (Y: PBX COS) to assign Class of Service restrictions to PBX lines.

Feature Reference:

Placing a Call
SMDR
Toll Restriction

Sub-Field: SMDR LOC

Access:

This sub-field is accessed after the SMDR PBX sub-field is programmed.

Description:

If this option is enabled, the SMDR device will print outgoing local calls. If this option is disabled, the SMDR device will not print local outgoing calls.

Instructions:

On Table 4-2, enter Y if local outgoing calls are to be printed; N if not.

Example: not applicable

Default Value: YES

Conditions:

Local calls are defined in T: TOLL RES. (J: NO. DIGS LOC CALL).

Related Programming:

- C: TMRS (SMDR OTG) to determine the minimum duration of a local call that will be printed on the SMDR.
- T: TOLL RES. (J: NO. DIGS LOC CALL) to determine the maximum number of digits that can comprise a local call.

Feature Reference:

Placing a Call
SMDR

PROGRAM F: FLGS (FLAGS)

Sub-Field: SMDR L.D.

Access:

This sub-field is accessed after the SMDR LOC sub-field is programmed.

Description:

If enabled, this option allows the SMDR device to print outgoing long distance calls. If disabled, the SMDR cannot print outgoing long distance calls.

Instructions:

On Table 4-2, enter Y if outgoing long distance calls can be printed; N if not.

Example: not applicable

Default Value: YES

Conditions:

The maximum number of digits that comprise a local call is determined in T: TOLL RES. (J: NO DIGS LOC CALL). If more than the specified number of digits are dialed, the call is regarded as a long distance call.

Related Programming:

- C: TMRS (SMDR OTG) to set the minimum duration of an outgoing call that will be recorded.
- T: TOLL RES. to determine the dialing restrictions on long distance calls.
- J: NO DIGS LOC CALL to determine the maximum number of digits that comprise a local call.

Feature Reference:

Placing a Call
SMDR
Toll Restriction

Sub-Field: SMDR BLCKED

Access:

This sub-field is accessed after the SMDR L.D. sub-field is programmed.

Description:

If an outgoing call is blocked due to Toll Restriction, this option allows a blocked indication to be printed on the SMDR record. If this option is disabled, a record of the outgoing call does not print.

Instructions:

On Table 4-2, enter Y if the blocked indication is desired; N if the incomplete call should not be printed.

Example: not applicable

Default Value: YES

Conditions:

- (a) Dialing restrictions must be imposed before outgoing calls can be blocked.
- (b) To ensure that all blocked calls will print on the SMDR, set the SMDR OTG timer to 00.

Related Programming:

- T: TOLL RES. to determine dialing restrictions.
- S: ST OPTS (COS LINE #) to determine the Class of Service for each line, at each station.
- C: TMRS (SMDR OTG) at 00 to ensure that all blocked calls will print on the SMDR.

Feature Reference:

Placing a Call
SMDR
Toll Restriction

PROGRAM F: FLGS (FLAGS)

Sub-Field: PG RCV BEEP

Access:

This sub-field is accessed after the SMDR BLCKED sub-field is programmed.

Description:

If enabled, this flag causes a tone to be sent to every speaker-equipped telephone in the system to indicate that a page has been initiated. If disabled, paging announcements are received without a preceding beep.

Instructions:

If a PG RCV BEEP tone is to be broadcast before every paging announcement, enter Y on Table 4-2; N if a tone is not required.

Example: not applicable

Default Value: YES

Conditions:

A telephone must be programmed to receive paging announcements for this sub-field to be meaningful.

Related Programming:

S: ST OPTS (INT PG 7.0) to program stations to selectively receive page zones (61-67 and All Call).

Feature Reference:

Paging

Sub-Field: PRV TONES (Alert/Privacy Tones)

Access:

This sub-field is accessed after the PG RCV BEEP sub-field is programmed.

Description:

The Privacy (Alert) Tone indicates to a station that an open Handsfree Answerback (or Barge In) link still exists between it and another station in the system. If the Privacy Tone is required on a system wide basis, this option is enabled. If the Privacy Tone is not required, this option is disabled.

Instructions:

On Table 4-2, enter Y if a Privacy Tone is required; N if not.

Example: not applicable

Default Value: NO

Conditions:

The Privacy Tone only applies to a Voice Announced or Barge In call.

Related Programming:

C: TMRS (PRV TONE) to program the interval between Privacy Tones.

Feature Reference:

Alert Tone
Barge In
Handsfree Answerback
Intercom

PROGRAM F: FLGS (FLAGS)

Sub-Field: TCX-128 KSU

Access:

This sub-field is accessed after the PRV TONES sub-field is programmed.

Description:

The EK-1648 B-CPU-B Printed Circuit Board can be installed in an EK-824 or EK-1232 KSU. If this option is enabled, the system must be installed in an EK-824 or EK-1232 KSU. If this option is disabled, the system must be installed in the standard EK-1648 KSU.

Instructions:

If the system is installed in an EK-824 or EK-1232 KSU, enter Y for this option on Table 4-2. Enter N if the system is installed in the standard EK-1648 KSU.

Example: not applicable

Default Value: NO

Conditions:

(a) Enabling this flag also allows the EK-1648 B-CPU-B to be used with a TCX-128 KSU.

(b) If the TCX-128 KSU flag is not enabled, the first B-8SCU-C board in an EK-824 or EK-1232 KSU will not respond.

(c) If an EK-824 or EK-1232 system is upgraded to an EK-1648 system, this option must be disabled. In addition, the connections to the 66M1-50 block for ports 1-8 must be moved. Refer to Section 5, INSTALLATION, for complete installation details.

Related Programming:

K: TENANTS to disable unused lines for the EK-824 and EK-1232 KSUs (when normal Tenant Service is not required).

Feature Reference:

Tenant Service

Sub-Field: MIC OFF IF DIALING

Access:

This sub-field is accessed after the TCX-128 KSU sub-field is programmed.

Description:

This option is designed to make the system compatible with the current display telephone (P/N 86073 and P/N 86063). When the system is installed, the flag is generally left at its default value (YES). This turns the telephone transmitter off during dialing of outside calls and holds the transmitter off for six seconds after the last digit is manually dialed. This prevents conversation or noise near the telephone from causing misdialing.

Instructions:

On Table 4-2, enter Y if display telephones (P/N 86073 or P/N 86063) are being used.

Example: not applicable

Default Value: YES

Conditions:

If the called party is connected before the six-second interval elapses, conversation is temporarily prevented. If the condition occurs frequently, it may be desirable to change MIC OFF IF DIALING programming to NO. This causes the transmitter to be left on during dialing. Conversation is allowed as soon as the called party answers. This does, however, increase the risk of misdialing.

Related Programming:

S: ST OPTS (TYPE) must be programmed as KEY for display telephones.

Feature Reference:

Placing a Call

PROGRAM G: GRPS (LINE GROUPS)

PROGRAM G: GRPS (Line Groups)

Field: G: GRPS (Line Groups)

Access:

Press the M key to enter the programming mode. Press the G key to program G: GRPS.

The following sub-fields (shown with their default values) can be programmed:

DIAL 9 GRP 1
MEM DIAL GRP 1

Description:

The G: GRPS field allows any of the 16 available line groups to be assigned as the DIAL 9 GRP or the MEM DIAL GRP. Line groups are assigned in the L: CO OPTS field.

Instructions:

Refer to the following sub-fields.

Example:

Refer to the following sub-fields.

Default Value:

Refer to the following sub-fields.

Conditions:

Refer to the following sub-fields.

Related Programming:

Refer to the following sub-fields.

Feature Reference:

Refer to the following sub-fields.

Sub-Field: DIAL 9 GRP

Access:

Press the M key to enter the programming mode. Press the G key to access the DIAL 9 GRP sub-field.

Description:

The DIAL 9 GRP sub-field assigns the line group obtained when a single line (2500 type), one button or four button telephone dials 9 to access an outside line. The system will place the call on the highest numbered available line in the group programmed. If this line is busy, the call will go out on the next highest numbered available line.

Instructions:

On Table 4-2, enter the number of the line group (1-16) to be designated as the DIAL 9 GRP.

Example:

If line group 4 is to be the dial 9 group, enter 4 for this sub-field on Table 4-2.

Default Value: 1 (Group 1)

Conditions:

(a) Line groups must be assigned to installed lines in L: CO OPTS.

(b) If searching is not permitted (in F: FLGS [CO SEARCH]), single line (2500 type), one button and four button telephones cannot place outgoing calls by dialing 9. These telephones can still place outgoing calls by dialing =0] - =16.

Related Programming:

L: CO OPTS (GROUP) to assign lines to groups.
S: ST OPTS (CO OUT) to grant outgoing access to lines in the dial 9 group.
F: FLGS (CO SEARCH) to enable searching for an available line on a system wide basis.

Feature Reference:

Placing a Call

PROGRAM G: GRPS (LINE GROUPS)

Sub-Field: MEM DIAL GRP

Access:

This sub-field is accessed after the DIAL 9 GRP sub-field is programmed.

Description:

The MEM DIAL GRP sub-field assigns the line group used when a System Speed Dial number is accessed, unless a specific line is assigned to the speed dial bin. The system will attempt to dial a System Speed Dial number on the highest numbered line in the MEM DIAL GRP. If this line is busy, the system will dial the number on the next highest numbered line in the designated group.

Instructions:

On Table 4-2, enter the line group to be used (1-16) when the system dials out a System Speed Dial number.

Example:

If line group 6 is to be used for System Speed Dial numbers (unless a line is specifically assigned to a bin), enter 6 on Table 4-2 for this sub-field.

Default Value: 1 (group 1)

Conditions:

- (a) The line group assigned must be programmed for installed lines in L: CO OPTS.
- (b) If searching is not enabled on a system-wide basis, specific lines must be programmed into System Speed Dial numbers or System Speed Dialing will be prevented.

Related Programming:

- L: CO OPTS (GROUP) to assign lines to groups.
- F: FLGS (CO SEARCH) to enable searching on a system-wide basis.

Feature Reference:

Speed Dial, System

PROGRAM L: CO OPTS (LINE OPTIONS)

PROGRAM L: CO OPTS (Line Options)

Field: L: CO OPTS

Access:

Press the M key to enter the programming mode. Press the L key to access the L: CO OPTS field. The system prompts:
ENT CO #

The following sub-fields (shown with their default values) can be programmed:

GROUP 1__
PULSE NO__
BEHIND PBX NO__
'1+' DIALING YES__
BUSY OUT NO__
UNIV NT ANS NO__
'10+' DIALING NO__

Description:

The L: CO OPTS field determines the line options for all 16 lines in the system. All of the options are programmed for all 16 lines.

Instructions:

Refer to the following sub-fields.

Example:

Refer to the following sub-fields.

Default Value:

Refer to the following sub-fields.

Conditions:

Refer to the following sub-fields.

Related Programming:

Refer to the following sub-fields.

Feature Reference:

Refer to the following sub-fields.

PROGRAM L: CO OPTS (LINE OPTIONS)

Sub-Field: GROUP

Access:

The GROUP sub-field is the first sub-field displayed after the L: CO OPTS field is accessed.

Description:

The GROUP sub-field assigns the line being programmed to a specified line group. Line groups are used for Speed Dial and "Dial 9" access to outside lines. It is recommended that similar lines be assigned to the same group. For example, all Wide Area Telephone Service (WATS) lines should be in one group, all Foreign Exchange (FX) lines in a second group, etc.

Instructions:

On Table 4-2, indicate the line group for all 16 lines.

Example:

If lines 1 through 4 are WATS lines, assign them to group 1.

Default Value:

All lines are initialized as group 1.

Conditions:

- (a) The system accommodates 16 line groups.
- (b) Grouping of lines must consider the line search assignments made in G: GRPS.

Related Programming:

G: GRPS for line search group requirements.
F: FLGS (CO SEARCH) to enable line searching for Speed Dial and Dial 9. This also allows four button, one button and single line (2500 type) telephones to use Last Number Redial if the line used for the original call is busy.

Feature Reference:

Last Number Redial
Placing a Call
Speed Dial, System

Sub-Field: PULSE

Access:

This sub-field is accessed after the GROUP sub-field is programmed.

Description:

The system assigns line type (DP vs. DTMF) on a line by line basis.

Instructions:

If the line being programmed is a DP line, enter Y for this sub-field on Table 4-2. If the line is a DTMF line, enter N.

Example:

If line 4 is to be a DTMF line, enter N for line 4 on Table 4-2.

Default Value: NO

Conditions:

The dialing mode can be changed from DP to DTMF during the dialing sequence by dialing *1 or by using Speed Dial Directive *88.

Related Programming:

G: GRPS to arrange similar lines in the same group.
C: TMRS (BRK MS, MAKE MS and INTRDG # PER) to match the parameters of the system to DP lines.
DTMF SPD DIAL and DTMF MAN DIAL to match the parameters of the system to DTMF lines.

Feature Reference:

Answering a Call
Placing a Call
Pulse to Tone Conversion
Speed Dial Directives

PROGRAM L: CO OPTS (LINE OPTIONS)

Sub-Field: BEHIND PBX

Access:

This sub-field is accessed after the PULSE sub-field is programmed.

Description:

Individual lines can be designated for operation behind a PBX.

Instructions:

If a line is to be behind a PBX, enter Y for this sub-field on Table 4-2. If the line is a CO line, enter N.

Example: not applicable

Default Value: NO

Conditions:

(a) When a line is installed behind a PBX, the system will impose dialing restrictions on the numbers following the PBX access code. If a PBX line is not correctly programmed in this sub-field, dialing restrictions will be imposed on the first digit dialed.

(b) If Last Number Redial is used on a line assigned as a PBX line (BEHIND PBX YES), a pause will be automatically inserted after the PBX access code dials out.

Related Programming:

T: TOLL RES. (Sub-fields D and L) for dialing restrictions.
T: TOLL RES. (Sub-fields X and Y) for PBX access code programming.

F: FLGS (SMDR PBX) to enable or disable SMDR for calls to PBX extensions.

Feature Reference:

Flash
Last Number Redial
Placing a Call
SMDR

Sub-Field: '1+ ' DIALING

Access:

This sub-field is accessed after the BEHIND PBX sub-field is programmed.

Description:

Certain areas do not require a leading 1 when dialing a toll call. The '1+ ' DIALING sub-field allows this determination to be made on a line-by-line basis. When '1+ ' DIALING is disabled (NO), the Toll Restriction check begins on the first digit dialed.

Instructions:

If a leading 1 is not required for long distance dialing, enter N for the designated line on Table 4-2. If a leading 1 is required, enter Y.

Example: not applicable

Default Value: YES

Conditions:

(a) Leading 1 or non-leading 1 capability is determined by the telco in the area in which the system is installed.

(b) If the system is installed behind a PBX, the Toll Restriction check will begin on the first digit following the PBX access code.

Related Programming:

L: CO OPTS (BEHIND PBX) to program PBX lines.
T: TOLL RES. (D and L sub-fields) to determine leading 1 and non-leading dialing restrictions.
T: TOLL RES. (A and B sub-fields) to assign restricted numbers for leading 1 and non-leading 1 areas.
T: TOLL RES. (sub-fields X and Y) to program PBX access codes.

Feature Reference:

Placing a Call
Toll Restriction

PROGRAM L: CO OPTS (LINE OPTIONS)

Sub-Field: BUSY OUT

Access:

This sub-field is accessed after the "1-" DIALING sub-field is programmed.

Description:

If a line is not installed or functioning correctly, it should be busied out. The BUSY OUT sub-field provides this facility.

Instructions:

For each line on Table 4-2, enter Y if the line should be busied out; N if not.

Example: not applicable

Default Value: NO

Conditions:

- (a) Lines can also be busied out from the attendant's station by dialing 7nn (where nn is the number of the line to be busied out).
- (b) Lines that are not installed should be busied out in this sub-field.

Related Programming:

G: GRPS Malfunctioning lines within a search group (Dial 9 or MEM) should be busied out to prevent the system from trying to place calls on them.

Feature Reference:

- Busy Out Lines
- Placing a Call
- Speed Dial System

Sub-Field: UNIV NT ANS (Universal Night Answer)

Access:

This sub-field is accessed after the BUSY OUT sub-field is programmed.

Description:

Lines can be enabled or disabled for Universal Night Answer. If a line is enabled for this sub-field, any telephone programmed for Universal Night Answer can answer a call ringing over the external paging system by dialing 69.

Instructions:

For each line on Table 4-2, enter Y if the line is assigned for UNA; N if it is not.

Example: not applicable

Default Value: NO

Conditions:

- (a) The external paging system requires the installation of optional equipment. See Section 6. INSTALLATION OF OPTIONAL EQUIPMENT.
- (b) The system must be in the night mode.
- (c) Single line (2500 type), one button and four button telephones must lift the handset and dial 69. Multibutton telephones must lift the handset, press the INT key and dial 69.
- (d) Assigned Night Answer (ANA) lines will ring and can be accessed via normal night mode split ringing (S: ST OPTS [CO AUD NT and CO INC NT]).

Related Programming:

- R: EXT RLY to program relays to activate external paging equipment.
- S: ST OPTS (TYPE EXT) to program unused stations as external audio outputs.
- S: ST OPTS (CO AUD NT and CO INC NT) to enable night audible and access for ANA lines.
- S: ST OPTS (UNIV NT ANS) to enable Universal Night Answer on a station-by-station basis.

Feature Reference:

- Night Service
- Paging

PROGRAM L: CO OPTS (LINE OPTIONS)

PROGRAM E: EXT PG (EXTERNAL PAGE)

Sub-Field: '10+' DIALING

PROGRAM E: EXT PG (External Page) Not Used

Access:

This sub-field is accessed after the UNTV NT ANS sub-field is programmed.

Description:

This sub-field designates lines to be individually assigned to Equal Access. Equal Access allows the normal Direct Distance Dialing (DDD) digits to be dialed after dialing 10 and a code of up to three digits (10nnn). Toll Restriction will be enforced on these lines after 10nnn is dialed.

Instructions:

For each line on Table 4-2, enter Y if the line is to be designated for "10+" Equal Access; N if not.

Example: not applicable

Default Value: NO

Conditions:

Equal Access capability must be provided by the telco in the area in which the system is installed.

Related Programming:

T: TOLL RES. (sub-field P) to designate the allowed equal access numbers.

Feature Reference:

Equal Access
Placing a Call
Toll Restriction

PROGRAM R: EXT RLY (EXTERNAL RELAYS)

PROGRAM R: EXT RLY (External Relays)

Field: R: EXT RLY

Access

Press the M key to enter the programming mode. Press the R key to access the first sub-field for R: EXT RLY. The following sub-fields (shown with their default values) can be programmed:

RLY 1 NT RNG 8..1 00__
RLY 1 NT RNG 16..9 00__

RLY 2 NT RNG 8..1 00__
RLY 2 NT RNG 16..9 00__

RLY 1 PG 7..0 00__
RLY 2 PG 7..0 00__

RLY 1 MISC 00__
RLY 2 MISC 00__

Description:

The R: EXT RLY field sets the conditions that will activate the external relays. The system has two relays that can be programmed to change state for calls ringing in when the system is in the night mode. The relays can also be programmed to change state when a Paging announcement is made. The relay contacts are typically used to activate loud ringing devices (for night mode audible) or external amplifiers (for external Page).

Instructions:

Refer to the sub-fields that follow.

Example:

Refer to the sub-fields that follow.

Default Value:

Refer to the sub-fields that follow.

Conditions:

Refer to the sub-fields that follow.

Related Programming:

Refer to the sub-fields that follow.

Feature Reference:

Refer to the sub-fields that follow.



PROGRAM R: EXT RLY (EXTERNAL RELAYS)

Sub-Field: RLY 1 NT RNG 8..1
 RLY 1 NT RNG 16..9

RLY 2 NT RNG 8..1
 RLY 2 NT RNG 16..9

Access:

Press the M key to enter the programming mode. Press the R key to access the first sub-field for R: EXT RLY.

Description:

The RLY # NT RNG sub-field determines which lines will activate the external relays when the system is in the night mode. Ringing on the lines indicated will cause the designated relay to change state.

Instructions:

On the bit graphs below, for each relay, place a 1 below each CO line which will activate the relay when the line rings at night. Place a 0 below the other CO lines. This will create eight bit binary numbers. Using Table 4-1, locate the binary numbers and enter the corresponding hexadecimal equivalents (00-FF) on Table 4-2.

CO LINE 8	CO LINE 7	CO LINE 6	CO LINE 5	CO LINE 4	CO LINE 3	CO LINE 2	CO LINE 1	HEX CODE
0	0	0	0	0	0	0	0	DEFAULT ENTRY 00
RELAY 1								
RELAY 2								

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NIGHT RING (8-1)

CO LINE 16	CO LINE 15	CO LINE 14	CO LINE 13	CO LINE 12	CO LINE 11	CO LINE 10	CO LINE 9	HEX CODE
0	0	0	0	0	0	0	0	DEFAULT ENTRY 00
RELAY 1								
RELAY 2								

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NIGHT RING (16-9)

Example:

If lines 1 and 8 should activate relay 1 when the system is in the night mode, on the relay 1/line 8-1 bit graph enter a 1 under line 8 and a 1 under line 1. All other entries on this bit graph are 0. The binary number 10000001 is created. Using Table 4-1, this binary number is converted to its hexadecimal equivalent (e.g., 81). Hex 81 is entered on Table 4-2.

Default Value:

RLY 1 NT RNG 8..1 00
 RLY 1 NT RNG 16..9 00

RLY 2 NT RNG 8..1 00
 RLY 2 NT RNG 16..9 00

The night mode does not activate the relays.

Conditions:

- (a) The external devices connected to the relays must be compatible with the relay specification. Refer to Section 6. INSTALLATION OF OPTIONAL EQUIPMENT.
- (b) The ringing device must be separately provided.
- (c) The relay can be used to switch an external amplifier. If the amplifier is to broadcast CO audible, the signal must be derived from an unused station port programmed as an external audio output.

Related Programming:

S: ST OPTS (TYPE EXT) to program an unused station as an external audio port.

Feature Reference:

Night Service

PROGRAM R: EXT RLY (EXTERNAL RELAYS)

Sub-Field: RLY 1 PG 7..0
 RLY 2 PG 7..0

Access:

This sub-field is accessed after the RLY 2 NT RNG 16..9 field is programmed.

Description:

The relays can be programmed to change state when the page zones specified in this sub-field are accessed. The relays are typically connected to devices which switch the page audio to loud paging devices.

Instructions:

On the bit graph below, for each relay, place a one below each page zone which will activate the relay. Place a 0 below the other page zones. This will create an eight bit binary number. Use Table 4-1 to convert this binary number to its hexadecimal equivalent. The hex equivalent is entered on Table 4-2.

PG 7..7	PG 7..6	PG 7..5	PG 7..4	PG 7..3	PG 7..2	PG 7..1	PG 7..0	HEX CODE
0	0	0	0	0	0	0	0	DEFAULT ENTRY 00
								RELAY 1
								RELAY 2

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PAGE ZONES (7-0)

Example:

If relay 1 is to change state whenever page zones 1 (dial 61) or 2 (dial 62) are accessed, place a 1 below these zones on the bit graph. The binary number 00000110 is created. Using Table 4-1, this binary number is converted to its hex equivalent of 06. Hex 06 is entered on Table 4-2.

Default Value:

RLY 1 PG 7..0	00
RLY 2 PG 7..0	00

Activating a page zone does not operate the relays.

Conditions:

In order for this sub-field to be meaningful, external paging equipment must be installed and external audio ports must be programmed. Refer to Section 6, INSTALLATION OF OPTIONAL EQUIPMENT for details on installing external paging equipment.

Related Programming:

S: ST OPTS (TYPE EXT) to program an unused station as an external audio port.

Feature Reference:

Paging

PROGRAM R: EXT RLY (EXTERNAL RELAYS)

Sub-Field:

0 0 0 0 0 0 0 0 O/C C/I

RLY 1 MISC

RLY 2 MISC

Access:

This field is accessed after the RLY 2 PG 7.0 field is programmed.

Description:

The relays programmed in the previous fields can be configured to:

- Open during night mode ringing (normally closed). In this mode the relay will open coincident with CO Audible or Page.
- Close during night mode ringing (normally open). In this mode the relay will close coincident with CO Audible or Page.
- Be continuously enabled during night mode ringing. In this mode the relay stays enabled as long as the call is ringing in.
- Be interrupted during night mode ringing. In this mode the relay follows each ring burst (i.e., 500mS on, 500mS off, 500 mS on, 2.5Sec off).

Instructions:

To program this sub-field:

- Place a 1 below the O/C bit if the relay is to close during ringing or Paging.
- Place a 0 below the O/C bit if the relay is to open during ringing or Paging.
- Place a 1 below the C/I bit if the relay should be continuously enabled (i.e., in its changed state) during ringing.
- Place a 0 below the C/I bit if the relay should be interrupted (i.e., changed state interrupted) during ringing.

The entries from the above instructions create an eight bit binary number. Use Table 4-1 to convert the eight bit binary number to its hexadecimal equivalent. The hex number is entered on Table 4-2.

O/C								C/I		HEX CODE	
0	0	0	0	0	0	0	0	0	0	0	0
DEFAULT ENTRY										0	0
RELAY 1											
RELAY 2											

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RELAY STATE

Example:

If relay 1 should close continuously during ringing, enter a 1 beneath the O/C and C/I bits on the bit graph. The binary number 00000011 is created. Using Table 4-1, this binary number is converted to hex 03 and entered on Table 4-2.

Default Value:

0 0 0 0 0 0 0 0 O/C C/I
RLY 1 MISC 00
RLY 2 MISC 00

When the system is initialized, the relays open (interrupted) during ringing.

Conditions:

- The circuits connected to the relays must be compatible with the relay specifications. Refer to Section 6, INSTALLATION OF OPTIONAL EQUIPMENT.
- The C/I bit has no affect on Paging. It is intended to provide increased flexibility for night mode ringing.
- Paging announcements have priority over ringing when operating the relays.

Related Programming:

S: ST OPTS (TYPE EXT) to assign an unused station as an external audio port.

Feature Reference:

Night Service
Paging

PROGRAM T: TOLL RES. (TOLL RESTRICTION)

PROGRAM T: TOLL RES. (Toll Restriction)

Field: T: TOLL RES.

Access:

Press the M key to enter the programming mode. Press the T key to program T: TOLL RES. The following prompt appears:

%H FOR HELP

Press the H key to display the following menu of the T: TOLL RES. sub-fields:

- D: '1+' NXX: COS
- L: NXX: COS
- R: RES. NOS.
- A: '1+' RES. NOS. COS
- B: RES. NOS. COS
- X: PBX CODES
- Y: PBX COS
- O: OCC LOC NOS.
- P: OCC EQ. ACCS. NOS.
- J: MISC.

Description:

Toll Restriction uses a station's Class of Service to impose dialing restrictions on outgoing calls. The system can impose Class of Service restrictions on area codes (NPX codes), office codes (NNX codes), selected restricted numbers, PBX and OCC access codes and System Speed Dial numbers. Toll restriction can be configured for leading 1 calls and non-leading 1 calls, and provides for Equal Access service.

Toll restriction can be tailored to the specific needs of the application through completely flexible Class of Service programming. If this degree of flexibility is not required, the system default programming provides for four different Classes of Service.

Instructions:

Press the key indicated by the Help Menu to access the Toll Restriction sub-field being programmed.

Example:

Refer to the sub-fields that follow.

Default Value:

In the default program, the dialing restrictions below are imposed.

Code:

- N is one digit, any digit 2 through 9.
- P is one digit, any digit 0 or 1.
- X is one digit, any digit 0 through 9.
- n is one digit, any digit 0 through 9.

Class of Service 0

Any number can be dialed.

Class of Service 1

- (a) Dialing 0 (operator) or 11 is not allowed.
- (b) Dialing 10 is allowed only if the line is programmed as a 10 + line in L: CO OPTS.
- (c) Dialing 1 + area code (1 + NPX) is not allowed.
- (d) Dialing 1 + exchange (1 + NNX), area codes (NPX), local exchanges (NNX), emergency numbers (1 + N11) or WATS (1 + 800) is allowed.
- (e) Intercom calls are allowed.

Class of Service 2

- (a) Dialing 0 (operator) or 11 is not allowed.
- (b) Dialing 10 is allowed only if the line is programmed as a 10 + line in L: CO OPTS.
- (c) Dialing 1 + area code (1 + NPX) and 1 + exchange (1 + NNX) is not allowed.
- (d) Dialing area codes (NPX), exchanges (NNX), emergency numbers (1 + N11) or WATS (1 + 800) is allowed.
- (e) Intercom calls are allowed.

Classes of Service 3 through 8

- (a) Dialing 0 or 11 is not allowed.
- (b) Dialing 10 is allowed only if the line is programmed as a 10 + line in L: CO OPTS.
- (c) Dialing 1 + area codes (1 + NPX), area codes (NPX), 1 + exchange (1 + NNX) or exchanges (NNX) is not allowed.
- (d) Dialing emergency numbers (1 + N11) or WATS (1 + 800) is allowed.
- (e) Intercom calls are allowed.

Conditions:

Refer to the sub-fields that follow.

Related Programming:

Refer to the sub-fields that follow.

Feature Reference:

Refer to the sub-fields that follow.

PROGRAM T: TOLL RES. (TOLL RESTRICTION)

Sub-Field: D: '1- 'NXX: COS

Access:

Once the Toll Restriction Help Menu is displayed, press the D key.

Description:

This sub-field determines which Classes of Service can dial the area (NPX) and office (NNX) codes in areas which require a leading 1 for toll calls (and the leading 1 is dialed). Additionally, the D sub-field is required if System Speed Dial numbers use the directive *85.

Instructions:

There are three basic methods for programming this sub-field: line by line, in ranges and global. In line by line programming, each NPX and NNX is programmed individually. In range programming, use nnn-xxx (where nnn signifies the limits of the range) to assign a range to receive the same COS entry. In global programming, enter NPX to program all area codes for the specified COSs; NNX for office codes.

It may be helpful to generate a hard copy of the D sub-field programming. This printout would serve as a record of the initial programming, and would allow individual NXX codes to be modified as needed.

For each NXX code on Table 4-3, enter a 1 for each Class of Service (COS) allowed to dial the area or exchange code. Enter 0 for each Class of Service which may not dial the area or exchange code.

To change a single Class of Service for an entire range:

- (1) Use nnn-xxx to specify the range.
- (2) Enter X for all Classes of Service in the range that will not change.

For example, to change range 200-512 from 11111111 to 01111111.

- (1) Specify the range (200-512).
- (2) Enter 0XXXXXX. COS 8 will be changed from 1 to 0 for the entire range.

Example:

If exchange code 226 should be accessible to all eight Classes of Service, enter 11111111 for code 226. See the sample worksheet to the right.

In some leading 1 dialing areas, the same NPX code will generate a long distance call if 1 - NPX is dialed and a local call if NPX is dialed without the leading 1. The system checks sub-field D only if a 1 precedes the code. If the code is preceded by a leading 1, dialing restrictions are imposed by the corresponding entry in sub-field D. If the code is not preceded by a leading 1, the system uses the dialing restrictions imposed by sub-field L.

Default Value:

Refer to page 4-43.

Conditions:

- (a) In leading 1 areas, sub-field D must be programmed for toll calls; L must be programmed for local calls.
- (b) If a leading 1 is not required for long distance calls, and if the Speed Dial Directive *85 is not used, programming this sub-field is not required. Refer to sub-field L: NXX: COS for relevant programming.

Related Programming:

- T: TOLL RES. (sub-field L) for local calls; (sub-field J) for directives *81- *84 and *85.
- S: ST OPTS (COS LINE # IS) to assign Class of Service on a line-by-line, station-by-station basis.

Feature Reference:

- Class of Service
- Placing a Call
- Toll Restriction

NXX	ALLOWED CLASS OF SERVICE							
	8	7	6	5	4	3	2	1
226	1	1	1	1	1	1	1	1

SAMPLE WORKSHEET

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PROGRAM T: TOLL RES. (TOLL RESTRICTION)

Sub-Field: L: NXX: COS

Access:

Once the Toll Restriction Help Menu is displayed, press the L key.

Description:

This sub-field determines which Classes of Service can dial the area (NPX) and office (NNX) codes in areas which do not require a leading 1 for toll calls. Sub-field L: NXX: COS also pertains to local calls dialed from areas which require a leading 1.

Instructions:

There are three basic methods for programming this sub-field: line by line, in ranges and global. In line by line programming, each NPX and NNX is programmed individually. In range programming, use nnn-xxx (where nnn signifies the limits of the range) to assign a range to receive the same COS entry. In global programming, enter NPX to program all area codes for the specified COSs; NNX for office codes.

It may be helpful to generate a hard copy of the L sub-field programming. This printout would serve as a record of the initial programming, and would allow individual NXX codes to be modified as needed.

For each NXX code on Table 4-4, enter a 1 for each Class of Service (COS) allowed to dial the area or exchange code. Enter 0 for each Class of Service which cannot dial the area or exchange code.

To change a single Class of Service for an entire range:

- (1) Use nnn-xxx to specify the range.
- (2) Enter X for all Classes of Service in the range that will not change.

For example, to change range 200-512 from 11111111 to 01111111.

- (1) Specify the range (200-512).
- (2) Enter 0XXXXXX. COS 8 will be changed from 1 to 0 for the entire range.

Example:

If exchange 888 should be accessible to all Classes of Service, enter 11111111 for this code. See the sample worksheet to the right.

In some leading 1 dialing areas, the same NPX code will generate a long distance call if 1 - NPX is dialed and a local call if NPX is dialed without the leading 1. The system checks sub-field D only if a 1 precedes the code. If the code is preceded by a leading 1, dialing restrictions are imposed by the corresponding entry in sub-field D. If the code is not preceded by a leading 1, the system uses the dialing restrictions imposed by sub-field L.

Default Value:

Refer to page 4-43.

Conditions:

This sub-field is relevant to toll and local calls in non-leading 1 areas and for local calls in leading 1 areas.

Related Programming:

T: TOLL RES. (sub-field D) to program NPX and NNX for leading 1 areas.

Feature Reference:

- Class of Service
- Placing a Call
- Toll Restriction

NXX	ALLOWED CLASS OF SERVICE							
	8	7	6	5	4	3	2	1
888	1	1	1	1	1	1	1	1

SAMPLE WORKSHEET

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April 1985

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PROGRAM T: TOLL RES. (TOLL RESTRICTION)

Sub-Field: R: RES. NOS.

Access:

Once the Toll Restriction Help Menu is displayed, press the R key to access this sub-field. The following prompts (shown with their default values) can be programmed:

- RES. NO. 1 IS NONE__
- RES. NO. 2 IS NONE__
- RES. NO. 3 IS NONE__
- RES. NO. 4 IS NONE__
- RES. NO. 5 IS NONE__
- RES. NO. 6 IS NONE__
- RES. NO. 7 IS NONE__
- RES. NO. 8 IS NONE__
- RES. NO. 9 IS NONE__
- RES. NO. 10 IS NONE__

The second restricted number is accessed after the first one is programmed, etc.

Description:

Up to ten telephone numbers can be programmed as restricted. Each number can be up to 16 digits long. This prevents users in the system from dialing these numbers, unless given the Classes of Service assigned in sub-fields A and B.

A partial telephone number can be entered. For example, the entry 212976 will restrict all numbers that begin with 212976. The character X can be used as a "wild card." For example, the entries X0X976 and XLX976 will restrict all calls with the office code of 976, in any area code, followed by any digits.

Instructions:

In response to each RES. NO. # IS prompt, enter the number desired on Table 4-2.

Example:

If the number 2039393305 should be fully restricted, enter the number in response to the RES. NO. 1 IS NONE__ prompt.

Default Value:

No restricted numbers are assigned.

Conditions:

Up to ten 16-digit numbers can be programmed.

Related Programming:

T: TOLL RES. (sub-fields A and B) to assign Classes of Service to the restricted numbers.

Feature Reference:

- Class of Service
- Placing a Call
- Toll Restriction

PROGRAM T: TOLL RES. (TOLL RESTRICTION)

Sub-Field: A: '1+' RES. NOS. COS

Access:

Once the Toll Restriction Help Menu is displayed, press the A key to access this sub-field. The following prompts (shown with their default values) can be programmed:

- '1+' RES. NO. 1 COS IS 00000000__
- '1+' RES. NO. 2 COS IS 00000000__
- '1+' RES. NO. 3 COS IS 00000000__
- '1+' RES. NO. 4 COS IS 00000000__
- '1+' RES. NO. 5 COS IS 00000000__
- '1+' RES. NO. 6 COS IS 00000000__
- '1+' RES. NO. 7 COS IS 00000000__
- '1+' RES. NO. 8 COS IS 00000000__
- '1+' RES. NO. 9 COS IS 00000000__
- '1+' RES. NO. 10 COS IS 00000000__

The second prompt is accessed after the first one is programmed, etc.

Description:

The Classes of Service assigned in this sub-field are allowed to dial the restricted numbers assigned in sub-field R: RES. NOS. Up to eight Classes of Service can be assigned to access the restricted numbers. This sub-field is for leading 1 area toll calls and *85 System Speed Dial calls only. If these types of calls should not have access to the restricted numbers, this sub-field need not be programmed.

Instructions:

On Table 4-2, indicate which Classes of Service should be able to access the restricted numbers. Enter 1 to allow access; 0 to deny access.

Example:

If only Class of Service 1 should be able to access restricted number 1 (for prompt RES. NO. 1 IS), enter 00000001 for the prompt '1+' RES. NO. 1 COS IS.

Default Value: 00000000

Conditions:

(a) This sub-field is applicable only for locations in leading 1 areas. The leading 1 must be dialed. Local calls dialed from a leading 1 area are restricted in the B: RES. NOS. COS sub-field.

(b) If the system is in a non-leading 1 area, no entries are required in this sub-field unless the directive *85 is used in a System Speed Dial bin.

(c) A: '1+' RES. NOS. COS will restrict only those numbers allowed in D: '1+' NNX: COS.

Related Programming:

- T: TOLL RES. (sub-field R) to designate restricted numbers.
- T: TOLL RES. (sub-field B) to assign Classes of Service to restricted numbers in non-leading 1 areas and for local calls.

Feature Reference:

- Placing a Call
- Speed Dial, System
- Toll Restriction

PROGRAM T: TOLL RES. (TOLL RESTRICTION)

Sub-Field: B: RES. NOS. COS

Access:

Once the Toll Restriction Help Menu is displayed, press the B key to access this sub-field. The following prompts (shown with their default values) can be programmed:

RES. NO. 1 COS IS 1111111__
RES. NO. 2 COS IS 1111111__
RES. NO. 3 COS IS 1111111__
RES. NO. 4 COS IS 1111111__
RES. NO. 5 COS IS 1111111__
RES. NO. 6 COS IS 1111111__
RES. NO. 7 COS IS 1111111__
RES. NO. 8 COS IS 1111111__
RES. NO. 9 COS IS 1111111__
RES. NO. 10 COS IS 1111111__

The second prompt is accessed after the first one is programmed, etc.

Description:

The B: RES. NOS. COS sub-field is used to allow specified Classes of Service to access the restricted numbers when the system is in a non-leading 1 area, when the directive *85 is not used in a System Speed Dial bin, or when a local call is placed to a restricted number from a leading 1 area.

Instructions:

On Table 4-2, enter 1 for each Class of Service that will be able to access the restricted number; 0 for those that cannot.

Example:

If all Classes of Service should be able to access restricted number 1, enter 1111111 for the prompt RES. NO. 1 COS IS.

Default Value:

Access to restricted numbers is allowed to all Classes of Service.

Conditions:

(a) This sub-field is meaningful for non-leading 1 areas and for local calls from leading 1 areas.

(b) B: RES. NOS. COS will restrict only those numbers allowed in D: *1+ NNX: COS and L: NNX: COS.

Related Programming:

- T: TOLL RES. (sub-field R) to designate restricted numbers.
- T: TOLL RES. (sub-field A) to assign Classes of Service to leading 1 restricted numbers.
- T: TOLL RES. (sub-fields D and L) to designate dialing restrictions for numbers that are not assigned as restricted numbers.

Feature Reference:

Placing a Call
Toll Restriction
Speed Dial, System

PROGRAM T: TOLL RES. (TOLL RESTRICTION)

Sub-Field: X: PBX CODES

Access:

Once the Toll Restriction Help Menu is displayed, press the X key to access this sub-field. The following prompts (shown with their default values) can be programmed:

- PBX CODE 1 IS NONE__
- PBX CODE 2 IS NONE__
- PBX CODE 3 IS NONE__
- PBX CODE 4 IS NONE__
- PBX CODE 5 IS NONE__
- PBX CODE 6 IS NONE__
- PBX CODE 7 IS NONE__
- PBX CODE 8 IS NONE__
- PBX CODE 9 IS NONE__
- PBX CODE 10 IS NONE__

The second prompt is accessed after the first one is programmed, etc.

Description:

A PBX access code is the code that must be dialed into a PBX to get an outside line. The system can be programmed with up to ten PBX access codes. Each PBX access code can be from one to four digits. The codes can consist of digits 0-9, * and #. The letter X is used as a "wild card" which can represent any allowable digit.

Instructions:

For the prompt PBX CODE # IS, enter the first code that the system should recognize as a PBX access code.

Example:

If the number =94 is to be programmed as PBX access code 9, enter =94 for the PBX CODE 9 IS prompt on Table 4-2.

Default Value: not assigned

Conditions:

- (a) Up to ten 4-digit PBX access codes can be programmed.
- (b) PBX access codes must be programmed if the system is installed behind a PBX so that the system can correctly start the toll restriction check (i.e., after the PBX access code is dialed). If the line is programmed as behind a PBX, and if the PBX access codes are not programmed, the toll restriction check will not start.

Related Programming:

- T: TOLL RES. (sub-field Y) to assign Classes of Service to PBX access codes.
- L: CO OPTS (BEHIND PBX) to assign lines as PBX lines.

Feature Reference:

- Placing a Call
- Toll Restriction

PROGRAM T: TOLL RES. (TOLL RESTRICTION)

Sub-Field: Y: PBX COS

Access:

Once the Toll Restriction Help Menu is displayed, press the Y key to access this sub-field. The following prompts (shown with their default values) can be programmed:

PBX CODE 1 COS IS 00000011__
PBX CODE 2 COS IS 00000011__
PBX CODE 3 COS IS 00000011__
PBX CODE 4 COS IS 00000011__
PBX CODE 5 COS IS 00000011__
PBX CODE 6 COS IS 00000011__
PBX CODE 7 COS IS 00000011__
PBX CODE 8 COS IS 00000011__
PBX CODE 9 COS IS 00000011__
PBX CODE 10 COS IS 00000011__

The second prompt is accessed after the first one is programmed, etc.

Description:

Class of Service access can be assigned to the PBX access codes designated in sub-field X: PBX CODES.

Instructions:

For each prompt for Y: PBX COS on Table 4-2, enter 1 for each Class of Service that should be able to access the PBX code; 0 for those that should not.

Example:

If all Classes of Service should be able to access PBX Access Code 9, enter on Table 4-2 11111111 for the prompt PBX CODE 9 COS IS.

Default Value: 00000011

Conditions: not applicable

Related Programming:

T: TOLL RES. (sub-field X) to assign PBX access codes.
L: CO OPTS (BEHIND PBX) to assign lines as PBX lines.

Feature Reference:

Placing a Call
Toll Restriction

Sub-Field: O: OCC LOC NOS.

Access:

Once the Toll Restriction Help Menu is displayed, press the O key to access this sub-field. The following prompts (shown with their default values) can be programmed:

OCC LOC # 1 IS NONE__
OCC LOC # 2 IS NONE__
OCC LOC # 3 IS NONE__
OCC LOC # 4 IS NONE__
OCC LOC # 5 IS NONE__
OCC LOC # 6 IS NONE__
OCC LOC # 7 IS NONE__
OCC LOC # 8 IS NONE__
OCC LOC # 9 IS NONE__
OCC LOC # 10 IS NONE__

The second prompt is accessed after the first one is programmed, etc.

Description:

Up to ten telephone numbers, required to access an OCC, can be assigned as OCC access codes. Each number can be up to eight digits long. OCC access codes allow restricted station users to dial into the OCC special services. Since this sub-field causes the dials on the restricted telephones to remain active after one of these codes is dialed, restricted stations can place calls (through OCCs) that would normally be denied to them.

Instructions:

For each O: OCC LOC NOS. prompt on Table 4-2, enter the access numbers assigned to each OCC.

Example:

If OCC LOC #1 requires an access code of 14325543, enter this value on Table 4-2 for the prompt OCC LOC # 1 IS.

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PROGRAM T: TOLL RES. (TOLL RESTRICTION)

Default Value: not assigned

Conditions:

- (a) Up to 10 8-digit OCC access codes are available.
- (b) After an OCC is accessed (if programmed in O: OCC LOC NOS.), the dial pad will be enabled for the number of digits equal to the sum of DDD digits allowed plus the number of OCC account code digits allowed.

Related Programming:

- T: TOLL RES. (D and L sub-fields) to grant access to the NPX and NNX codes required to access the OCC.
- T: TOLL RES. (P: OCC EQ. ACCS. NOS.) to program equal access.
- T: TOLL RES. (J: MISC.) to define the number of DDD digits (NO. DDD DIGS) and the number of OCC account/ security code digits (NO. OCC ACC DIGS) that can be dialed.

Feature Reference:

Placing a Call
Toll Restriction

PROGRAM T: TOLL RES. (TOLL RESTRICTION)

Sub-Field: P: OCC EQ. ACCS. NOS.

Access:

Once the Toll Restriction Help Menu is displayed, press the P key to access this sub-field. The following prompts (shown with their default values) can be programmed:

OCC EQ. ACCS. 1 IS NONE__
OCC EQ. ACCS. 2 IS NONE__
OCC EQ. ACCS. 3 IS NONE__
OCC EQ. ACCS. 4 IS NONE__
OCC EQ. ACCS. 5 IS NONE__
OCC EQ. ACCS. 6 IS NONE__
OCC EQ. ACCS. 7 IS NONE__
OCC EQ. ACCS. 8 IS NONE__
OCC EQ. ACCS. 9 IS NONE__
OCC EQ. ACCS. 10 IS NONE__

The second prompt is accessed after the first one is programmed, etc.

Description:

This sub-field allows up to ten equal access services to be assigned. Equal access allows telephone company customers to select a primary carrier for dialing toll calls. When a user dials 1 plus the area code and number, the call will go out on the customer's preselected primary carrier service. To dial toll calls on services other than the primary carrier service, the user dials 10, the desired carrier's three-digit code, 1, the area code and the telephone number. Codes are assigned to each carrier by the telco where the system is installed. The OCC Equal Access numbers must be entered so that toll restriction will be imposed on the digits dialed following the 10XXX code.

Instructions:

On Table 4-2, enter the 10XXX access code for each of the OCCs. The designations are made by the telco for the specific site. An X can be used as a "wild card" to represent any digit.

Example:

The OCC EQ. ACCS. 1 IS prompt is assigned to a DDD line with an access code (provided by the telco) of 10242. Enter this value on Table 4-2.

Default Value: not assigned

Conditions:

(a) Up to ten equal access services can be assigned. Each access code is in the format 10XXX or 9500XXX, where XXX is the code designated by the telco for the specified service.

(b) Each equal access line that requires 10XXX dialing must be programmed for '10+' DIALING. Equal access lines that use 9500XXX dialing should not be programmed for '10+' DIALING.

Related Programming:

T: TOLL RES. (sub-field O) to assign OCC access codes.
L: CO OPTS ('10+' DIALING) to program individual lines for 10xxx dialing.

Feature Reference:

Equal Access
Placing a Call
Toll Restriction

PROGRAM T: TOLL RES. (TOLL RESTRICTION)

Sub-Field: J: MISC.

Access:

Once the Toll Restriction Help Menu is displayed, press the J key to access this sub-field. The following prompts (shown with their default values) can be programmed:

- * 81 COS 11111111__
- * 82 COS 11111111__
- * 83 COS 11111111__
- * 84 COS 11111111__
- NO. DDD DIGS 11__
- NO. OCC ACC DIGS 6__
- NO. SMDR ACC DIGS 10__
- NO. DIGS LOC CALL 7__

The second prompt is accessed after the first one is programmed, etc.

Description:

J: MISC. allows miscellaneous Toll Restriction characteristics to be programmed. These determine which users can use directives *81 through *84, and define various parameters for DDD dialing, OCC account/security codes, SMDR Account Codes and local calls.

Instructions:

Refer to the prompts that follow.

Example:

Refer to the prompts that follow.

Default Value:

Refer to the prompts that follow.

Conditions:

Refer to the prompts that follow.

Related Programming:

Refer to the prompts that follow.

Feature Reference:

Refer to the prompts that follow.



PROGRAM T: TOLL RES. (TOLL RESTRICTION)

Prompt: *81 COS
*82 COS
*83 COS
*84 COS

Default Value:
*81 COS 11111111
*82 COS 11111111
*83 COS 11111111
*84 COS 11111111

Access

Once the Toll Restriction Help Menu is displayed, press the J key. The *81 COS prompt is the first one displayed. The remaining prompts are accessed as the preceding ones are programmed.

Description:

These prompts define the Classes of Service that are allowed to use System Speed Dial bins containing the directives *81, *82, *83 and *84. The directives are entered as the first three digits of System Speed Dial bins to allow users of toll restricted telephones to dial toll calls. The directives *81, *82, *83 and *84 can also be used to turn off toll restriction for the numbers stored in the bin. This allows restricted stations to use OCCs to which they would normally be denied access, by having the OCC access and authorization numbers stored in the specified bin.

Instructions:

On Table 4-2, enter a 1 for each Class of Service (8-1) that should be permitted to access the corresponding directive. If the Class of Service should not be able to access the System Speed Dial bin containing the directive, enter 0 where required.

Example:

If only Classes of Service 1 and 2 should be able to use a System Speed Dial bin containing the directive *81, enter 00000011 for the prompt *81 COS.

All Classes of Service are enabled for all directives.

Conditions:

- (a) This sub-field applies only to toll restricted telephones.
- (b) If the directive *81, *82, *83 or *84 is entered into the system bin to bypass Toll Restriction, *85 should be entered at the end of the bin to assure that normal dialing restrictions will be imposed once the bin has dialed out.
- (c) The *81, *82, *83 and *84 directives are used as allow facilities (i.e., the directives override D and L table restrictions).

Related Programming:

- S: ST OPTS (COS LINE # IS) to assign Class of Service to each line.
- T: TOLL RES. (sub-fields D and L) to impose dialing restrictions.

Feature Reference:

Speed Dial, System
Toll Restriction

PROGRAM T: TOLL RES. (TOLL RESTRICTION)

Prompt: NO. DDD DIGS

Access:

The NO. DDD DIGS prompt is accessed after the *34 COS prompt is programmed.

Description:

NO. DDD DIGS is the number of Direct Distance Dialing (DDD) digits that can be dialed at a toll restricted station before the dial pad is cut off (disabled). For a toll restricted station, this entry is the total number of digits that can be dialed.

Instructions:

On Table 4-2, enter the total number of DDD digits that can be dialed before dial pad cutoff occurs. Since the # used to designate the beginning of an SMDR Account Code is counted as a DDD digit by this program, the entry should always be one more than the number of DDD digits actually required. If this is not done, manually entering Account Codes would be prevented.

Example:

If the total number of DDD digits should be 7, enter 8 for this prompt on Table 4-2.

Default Value: 11

Conditions:

- (a) This sub-field applies only to toll restricted telephones.
- (b) The number of DDD digits cannot be less than four.

Related Programming:

- S: ST OPTS (COS LINE # IS) to assign Class of Service to lines.
- T: TOLL RES. (sub-fields D and L) to impose dialing restrictions.

Feature Reference:

- Placing a Call
- Toll Restriction

Prompt: NO. OCC ACC DIGS

Access:

The NO. OCC ACC DIGS prompt is accessed after the NO. DDD DIGS prompt is programmed.

Description:

This prompt determines the maximum number of OCC account code (access) digits that can be dialed. After one of the OCC local numbers assigned in sub-field O is dialed, the dial pad on a toll restricted telephone will turn off after the maximum number of OCC account digits (plus the maximum number of DDD digits) are dialed.

Instructions:

On Table 4-2, enter the maximum number of OCC account code (access) digits desired.

Example:

If 4 OCC account code digits are to be allowed, enter 4 for this prompt on Table 4-2.

Default Value: 6

Conditions: not applicable

Related Programming:

T: TOLL RES. (sub-field O) to assign OCC access codes.

Feature Reference:

- Placing a Call
- Toll Restriction

4

PROGRAM T: TOLL RES. (TOLL RESTRICTION)

Prompt: NO. SMDR ACC DIGS

Access:

The NO. SMDR ACC DIGS prompt is accessed after the NO. OCC ACC DIGS prompt is programmed.

Description:

The NO. SMDR ACC DIGS prompt determines the maximum allowable number of SMDR Account Code digits that can be dialed by a toll restricted station. If more than the programmed number are dialed, the dial pad is cut off (disabled). The SMDR Account Code digits are used to assign account numbers to the SMDR call record.

Instructions:

On Table 4-2, enter the maximum number of SMDR Account Code digits desired. Since this program counts the # used to designate the end of an Account Code as a digit, always enter one more digit than is actually required. If this is not done, correct Account Code entry would be prevented.

Example:

If the SMDR Account Code should be restricted to 8 digits, enter 9 for this prompt on Table 4-2.

Default Value: 10 (Includes nine digits and #.)

Conditions: not applicable

Related Programming:

- C: TMRS (SMDR OTG, SMDR INC) to set SMDR timer parameters.
- F: FLGS to enable/disable INC, RNA, PBX, local and long distance calls for SMDR.

Feature Reference:

Account Code Capability
SMDR

Prompt: NO. DIGS LOC CALL

Access:

The NO. DIGS LOC CALL prompt is accessed after the NO. SMDR ACC DIGS prompt is programmed.

Description:

This prompt defines the number of digits that comprise a local call. Calls that do not use more than the specified number of digits programmed in NO. DIGS LOC CALL are recorded on the SMDR printout when local calls are printed. Calls that use more than the specified number of digits are recorded on the SMDR printout when long distance calls are printed.

Instructions:

On Table 4-2, enter the number of digits that specify a local call.

Example:

If local calls should consist of 6 digits or less, enter 6 for this prompt on Table 4-2.

Default Value: 7

Conditions:

Calls equal to or less than the NO. DIGS LOC CALL value are defined as local calls. Calls greater than the NO. DIGS LOC CALL value are defined as long distance calls.

Related Programming:

- F: FLGS (SMDR LOC) to enable/disable SMDR for local calls.
- T: TOLL RES. (sub-fields L, R and O) to define allowable local calls.

Feature Reference:

Placing a Call
SMDR
Toll Restriction

PROGRAM P: PORTS

PROGRAM P: PORTS

Field: P: PORTS

Access:

Press the M key to enter the programming mode. Press the P key to access the P: PORTS field. As soon as the P key is pressed, the system prompts:

ENT PRT #

Press the RETURN key to access port 1, or enter the port number desired (1-48) and press the RETURN key. The following prompts (shown with their default values) can be programmed:

PRT 1 IS ST 1__

PRT 2 IS ST 2__

PRT 3 IS ST 3__

PRT 4 IS ST 4__ through

PRT 48 IS ST 48__

The PRT 2 IS ST 2__ sub-field is accessed after the PRT 1 IS ST 1__ sub-field is programmed, etc.

Description:

Each station in the system is assigned to a port. A port is a fixed location (position) in the KSU, although the station number assigned to each port can be changed. This facility allows for a flexible numbering plan, eliminating the need to reconfigure the installation if stations are moved. Station programming follows the station numbers, not the port numbers.

Instructions:

On Table 4-5, enter the number of the port (1 through 48) to which each station is to be assigned. Entries need only be made if the assignment differs from the initialized values.

Example:

In general, this field is programmed on an individual basis as the installation changes. To change the port assignments for stations 10 and 11, press the M key, then press the P key. When the system prompts ENT PRT #, enter 10 and press the RETURN key. When the system prompts PRT 10 IS ST, enter 11 and press the RETURN key. When the system prompts PRT 11 IS ST, enter 10 and press the RETURN key. Station 10 is now assigned to port 11; station 11 is now assigned to port 10.

Default Value:

Port 1 is assigned to Station 1. Port 2 is assigned to Station 2, etc. Port 48 is assigned to Station 48.

Conditions:

(a) If an error is made in programming P: PORTS (e.g., two ports assigned to the same station), the system will prompt with PRT-STN ERROR when the programming mode is exited.

(b) The EK-824 KSU serves 24 ports (1-24).
The EK-1232 KSU serves 32 ports (1-32).
The EK-1648 KSU serves 48 ports (1-48).

Related Programming:

S: ST OPTS to determine the features assigned to the station.

Feature Reference:

Flexible Numbering Plan

PROGRAM S: ST OPTS (STATION OPTIONS)

PROGRAM S: ST OPTS (Station Options)

Field: S: ST OPTS

Access:

Press the M key to enter the programming mode. Press the S key to access the S: ST OPTS field. As soon as the S key is pressed, the system prompts:

ENT ST #

Press the RETURN key to access station 1, or enter the station number desired (1-48) and press the RETURN key. The following prompts (shown with their default values) can be programmed:

TYPE KEY__
HOTLINE 1__
COS LINE 1 IS 0__
COS LINE 2 IS 0__
COS LINE 3 IS 0__
COS LINE 4 IS 0__
COS LINE 5 IS 0__
COS LINE 6 IS 0__
COS LINE 7 IS 0__
COS LINE 8 IS 0__
COS LINE 9 IS 0__
COS LINE 10 IS 0__
COS LINE 11 IS 0__
COS LINE 12 IS 0__
COS LINE 13 IS 0__
COS LINE 14 IS 0__
COS LINE 15 IS 0__
COS LINE 16 IS 0__
CO AUD DY 8..1 00__
CO AUD DY 16..9 00__
CO AUD NT 8..1 FF__
CO AUD NT 16..9 FF__
CO INC DY 8..1 FF__
CO INC DY 16..9 FF__
CO INC NT 8..1 FF__
CO INC NT 16..9 FF__
CO OUT DY 8..1 FF__
CO OUT DY 16..9 FF__
CO OUT NT 8..1 FF__
CO OUT NT 16..9 FF__

INT PG 7..0 03__
INT CALL WTG NO__
BGM YES__
CALL FWD YES__
HF YES__
RCV BRG IN YES__
CO CALL WTG YES__
UNIV NT ANS YES__

^Default value dependent on station number.

As each sub-field is programmed, the succeeding sub-field is accessed.

Description:

Each station in the system is individually programmed for various options. These options are assigned in the S: ST OPTS field.

Instructions:

Refer to the sub-fields that follow.

Example:

Refer to the sub-fields that follow.

Default Value:

Refer to the sub-fields that follow.

Conditions:

The EK-824 KSU accommodates up to 24 stations. The EK-1232 KSU accommodates up to 32 stations. The EK-1648 KSU accommodates up to 48 stations.

Related Programming:

Refer to the sub-fields that follow.

Feature Reference:

Refer to the sub-fields that follow.

PROGRAM 5: ST OPTS (STATION OPTIONS)

Sub-Field: TYPE

Access:

Press the M key to enter the programming mode. Press the S key to access the S: ST OPTS field. The ENT ST # prompt is displayed. Press the RETURN key to access the TYPE sub-field for station 1, or enter the station number (1-48) and press the RETURN key to access any other station.

Description:

The TYPE sub-field is used to designate the type of telephone instrument installed at the extension. The available types are:

KEY for a Multibutton Key Telephone
DS1 for the top half of a dual port DSS console
DS2 for the bottom half of a dual port DSS console
DS3 for a single port DSS console
SLI for a Four Button Key Telephone
500 for a 2500 type or one button telephone
EXT for an external audio output (used for external paging - refer to Section 6, INSTALLATION OF OPTIONAL EQUIPMENT).

NOTE: Single line 2500 type and one button telephones require that B-SLU-B PCBs be installed. Refer to Section 5, INSTALLATION.

Instructions:

On Table 4-5, enter the type of station instrument required.

Example:

If station 1 (extension number 301) is the top half of a dual port DSS console, enter DS1.

Default Value: KEY

Conditions:

(a) The type entered for this sub-field must match the telephone instrument installed.

(b) If EXT is entered for TYPE, the prompts which can be programmed are limited to:

CO AUD DY 8..1
CO AUD DY 16..9
CO AUD NT 8..1
CO AUD NT 16..9
INT PG 7..0
BGM

Related Programming:

P: PORTS to determine port assignment for station.

Feature Reference: not applicable

PROGRAM S: ST OPTS (STATION OPTIONS)

Sub-Field: *HOTLINE*

Access:

The *HOTLINE* sub-field is accessed after the *TYPE* sub-field is programmed.

Description:

Station pairs can be configured as Hotline partners.

Instructions:

On Table 4-5, enter the number of the station that is to be the Hotline partner for the station being programmed. The Hotline partner must be programmed in a similar manner.

Example:

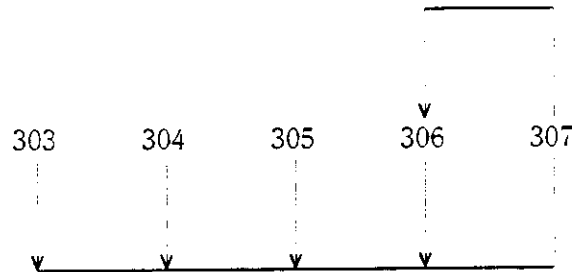
If stations 301 and 315 are to be Hotline partners, enter 15 as the Hotline partner for station 301. Enter 01 as the Hotline partner for station 315.

Default Value: not assigned

Conditions:

- (a) Each station can have only one Hotline partner.
- (b) The system can be programmed so that stations are part of a Hotline group, rather than assigned to a single Hotline partner. For each station in the group, the station reached when the HL key is pressed is determined by the entry made in S: ST OPTS (*HOTLINE*) programming.

(c) The example below illustrates a typical Hotline group. The S: ST OPTS (*HOTLINE*) entry for stations 303 through 306 is 307. The S: ST OPTS (*HOTLINE*) entry for station 307 is 306. Stations 303 through 306 are connected for Intercom and other Hotline features to station 307 when the HL key is pressed. Station 307 is connected to station 306 for Intercom and other Hotline features when the HL key is pressed. The HL lamp for stations 303, 304, 305 and 306 will indicate status for station 307. Only the status of station 306 will indicate on the HL lamp for station 307.



Related Programming: not applicable

Feature Reference:

Hotline

PROGRAM 5: ST OPTS (STATION OPTIONS)

Sub-Field: COS LINE 1 IS
COS LINE 2 IS etc.
COS LINE 16 IS

Access:

This sub-field is accessed after the HOTLINE sub-field is programmed. Each COS LINE sub-field is sequentially accessed as the previous COS LINE sub-field is programmed.

Description:

A station's Class of Service determines the dialing restrictions imposed on that station. There are eight restrictive Classes of Service available in the system (1 through 8), in addition to Class of Service 0 (unrestricted). Class of Service for each station is established on a line by line basis. Dialing capabilities for the Class of Service are determined by Toll Restriction (T: TOLL RES.) programming.

Instructions:

On Table 4-6, indicate the Class of Service for each line.

Example: not applicable

Default Value: Class of Service 0 (unrestricted)

Conditions:

(a) Classes of Service 1 through 8 are configured in Toll Restriction programming (refer to page 4-78). Class of Service 0 is unrestricted.

(b) The EK-824 KSU accommodates up to 8 lines. The EK-1232 KSU accommodates up to 12 lines. The EK-1648 KSU accommodates up to 16 lines.

Related Programming:

T: TOLL RES. to determine dialing restrictions if different from the default assignments.

Feature Reference:

- Class of Service
- Placing a Call
- Toll Restriction

Sub-Field: CO AUD DY 8..1
CO AUD DY 16..9

Access:

The CO AUD sub-fields are accessed after the COS LINE 16 IS sub-field is programmed. The CO AUD DY 16..9 sub-field is accessed after the CO AUD DY 8..1 sub-field is programmed.

Description:

Stations can be programmed to receive ringing on specified lines. The CO AUD DY sub-fields designate which lines should ring at the station being programmed during the day.

Instructions:

On the CO Audible Day bit graph, place a 1 below each line that should ring at the station during the day. Place a 0 below all other lines. The assignment of 1s and 0s creates an eight bit binary number. Use Table 4-1 to convert the eight bit binary number to a two bit hexadecimal number. Enter the hex number on Table 4-5.

Example:

If station 301 should receive day ringing for all lines within a sub-field, enter a 1 beneath each line on the bit graph. The binary number 11111111 is converted to FF and entered on Table 4-5.

Default Value: 00 (day ringing disabled)

Conditions:

Incoming access must be granted to allow the ringing calls to be answered.

Related Programming:

- L: CO OPTS to program the options for the lines that will ring.
- S: ST OPTS (CO INC DY) to allow the ringing calls to be answered.

Feature Reference:

- Answering a Call
- Split Ringing

PROGRAM S: ST OPTS (STATION OPTIONS)

CO AUDIBLE (DAY) - LINES 8-1

CO LINES	BIT NUMBER	DEFAULT	1	2	3	4	5	6	7	8	HEX DD
STA 325	7	0	0	0	0	0	0	0	0	0	
STA 326	6	0	0	0	0	0	0	0	0	0	
STA 327	5	0	0	0	0	0	0	0	0	0	
STA 328	4	0	0	0	0	0	0	0	0	0	
STA 329	3	0	0	0	0	0	0	0	0	0	
STA 330	2	0	0	0	0	0	0	0	0	0	
STA 331	1	0	0	0	0	0	0	0	0	0	
STA 332	0	0	0	0	0	0	0	0	0	0	
STA 333	7	0	0	0	0	0	0	0	0	0	
STA 334	6	0	0	0	0	0	0	0	0	0	
STA 335	5	0	0	0	0	0	0	0	0	0	
STA 336	4	0	0	0	0	0	0	0	0	0	
STA 337	3	0	0	0	0	0	0	0	0	0	
STA 338	2	0	0	0	0	0	0	0	0	0	
STA 339	1	0	0	0	0	0	0	0	0	0	
STA 340	0	0	0	0	0	0	0	0	0	0	
STA 341	7	0	0	0	0	0	0	0	0	0	
STA 342	6	0	0	0	0	0	0	0	0	0	
STA 343	5	0	0	0	0	0	0	0	0	0	
STA 344	4	0	0	0	0	0	0	0	0	0	
STA 345	3	0	0	0	0	0	0	0	0	0	
STA 346	2	0	0	0	0	0	0	0	0	0	
STA 347	1	0	0	0	0	0	0	0	0	0	
STA 348	0	0	0	0	0	0	0	0	0	0	

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CO AUDIBLE (DAY) - LINES 8-1

CO LINES	BIT NUMBER	DEFAULT	1	2	3	4	5	6	7	8	HEX DD
STA 301	7	0	0	0	0	0	0	0	0	0	
STA 302	6	0	0	0	0	0	0	0	0	0	
STA 303	5	0	0	0	0	0	0	0	0	0	
STA 304	4	0	0	0	0	0	0	0	0	0	
STA 305	3	0	0	0	0	0	0	0	0	0	
STA 306	2	0	0	0	0	0	0	0	0	0	
STA 307	1	0	0	0	0	0	0	0	0	0	
STA 308	0	0	0	0	0	0	0	0	0	0	
STA 309	7	0	0	0	0	0	0	0	0	0	
STA 310	6	0	0	0	0	0	0	0	0	0	
STA 311	5	0	0	0	0	0	0	0	0	0	
STA 312	4	0	0	0	0	0	0	0	0	0	
STA 313	3	0	0	0	0	0	0	0	0	0	
STA 314	2	0	0	0	0	0	0	0	0	0	
STA 315	1	0	0	0	0	0	0	0	0	0	
STA 316	0	0	0	0	0	0	0	0	0	0	
STA 317	7	0	0	0	0	0	0	0	0	0	
STA 318	6	0	0	0	0	0	0	0	0	0	
STA 319	5	0	0	0	0	0	0	0	0	0	
STA 320	4	0	0	0	0	0	0	0	0	0	
STA 321	3	0	0	0	0	0	0	0	0	0	
STA 322	2	0	0	0	0	0	0	0	0	0	
STA 323	1	0	0	0	0	0	0	0	0	0	
STA 324	0	0	0	0	0	0	0	0	0	0	

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PROGRAM 5: ST OPTS (STATION OPTIONS)

CO AUDIBLE (DAY) - LINES 16-9

CO LINES	BIT NUMBER	16	15	14	13	12	11	10	9	HEX 00
STIA 325	7	0	0	0	0	0	0	0	0	
STIA 326	7	0	0	0	0	0	0	0	0	
STIA 327	7	0	0	0	0	0	0	0	0	
STIA 328	7	0	0	0	0	0	0	0	0	
STIA 329	7	0	0	0	0	0	0	0	0	
STIA 330	7	0	0	0	0	0	0	0	0	
STIA 331	7	0	0	0	0	0	0	0	0	
STIA 332	7	0	0	0	0	0	0	0	0	
STIA 333	7	0	0	0	0	0	0	0	0	
STIA 334	7	0	0	0	0	0	0	0	0	
STIA 335	7	0	0	0	0	0	0	0	0	
STIA 336	7	0	0	0	0	0	0	0	0	
STIA 337	7	0	0	0	0	0	0	0	0	
STIA 338	7	0	0	0	0	0	0	0	0	
STIA 339	7	0	0	0	0	0	0	0	0	
STIA 340	7	0	0	0	0	0	0	0	0	
STIA 341	7	0	0	0	0	0	0	0	0	
STIA 342	7	0	0	0	0	0	0	0	0	
STIA 343	7	0	0	0	0	0	0	0	0	
STIA 344	7	0	0	0	0	0	0	0	0	
STIA 345	7	0	0	0	0	0	0	0	0	
STIA 346	7	0	0	0	0	0	0	0	0	
STIA 347	7	0	0	0	0	0	0	0	0	
STIA 348	7	0	0	0	0	0	0	0	0	

CO AUDIBLE (DAY) - LINES 16-9

CO LINES	BIT NUMBER	16	15	14	13	12	11	10	9	HEX 00
STIA 301	7	0	0	0	0	0	0	0	0	
STIA 302	7	0	0	0	0	0	0	0	0	
STIA 303	7	0	0	0	0	0	0	0	0	
STIA 304	7	0	0	0	0	0	0	0	0	
STIA 305	7	0	0	0	0	0	0	0	0	
STIA 306	7	0	0	0	0	0	0	0	0	
STIA 307	7	0	0	0	0	0	0	0	0	
STIA 308	7	0	0	0	0	0	0	0	0	
STIA 309	7	0	0	0	0	0	0	0	0	
STIA 310	7	0	0	0	0	0	0	0	0	
STIA 311	7	0	0	0	0	0	0	0	0	
STIA 312	7	0	0	0	0	0	0	0	0	
STIA 313	7	0	0	0	0	0	0	0	0	
STIA 314	7	0	0	0	0	0	0	0	0	
STIA 315	7	0	0	0	0	0	0	0	0	
STIA 316	7	0	0	0	0	0	0	0	0	
STIA 317	7	0	0	0	0	0	0	0	0	
STIA 318	7	0	0	0	0	0	0	0	0	
STIA 319	7	0	0	0	0	0	0	0	0	
STIA 320	7	0	0	0	0	0	0	0	0	
STIA 321	7	0	0	0	0	0	0	0	0	
STIA 322	7	0	0	0	0	0	0	0	0	
STIA 323	7	0	0	0	0	0	0	0	0	

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PROGRAM S: ST OPTS (STATION OPTIONS)

Sub-Field: CO AUD NT 8..1
CO AUD NT 16..9

Access:

The CO AUD NT sub-fields are accessed after the CO AUD DY 16..9 sub-field is programmed. The CO AUD NT 16..9 sub-field is accessed after the CO AUD NT 8..1 sub-field is programmed.

Description:

Stations can be programmed to receive ringing on specified lines. The CO AUD NT sub-fields designate which lines should ring at the station being programmed when the system is in the Night Mode.

Instructions:

On the CO Audible Night bit graph, place a 1 below each line that should ring at the station during the night. Place a 0 below all other lines. The assignment of 1s and 0s creates an eight bit binary number. Use Table 4-1 to convert the eight bit binary number to a two bit hexadecimal number. Enter the hex number on Table 4-5.

Example:

If station 301 should receive night ringing for all lines within a sub-field, enter a 1 beneath each line on the bit graph. The binary number 11111111 is converted to hexadecimal FF and entered on Table 4-5.

Default Value: FF (all lines ring at night)

Conditions:

(a) Unless incoming access and/or UNA are granted, the ringing calls cannot be answered.

(b) Night audible may also be broadcast over the paging system, if installed. Refer to Section 6. INSTALLATION OF OPTIONAL EQUIPMENT.

Related Programming:

L: CO OPTS to program the options for the lines.

S: ST OPTS (CO INC NT) to allow ringing calls to be answered.

S: ST OPTS (UNIV NT ANS) to allow/deny UNA for lines that do not receive night audible and access.

Feature Reference:

Answering a Call

Night Service

Split Ringing

PROGRAM 5: ST OPTS (STATION OPTIONS)

CO AUDIBLE (NIGHT) - LINES 8-1

CO LINES	BIT NUMBER	8	7	6	5	4	3	2	1	HEX FF
DEFAULT		1	1	1	1	1	1	1	0	1
SIA 325										
SIA 326										
SIA 327										
SIA 328										
SIA 329										
SIA 330										
SIA 331										
SIA 332										
SIA 333										
SIA 334										
SIA 335										
SIA 336										
SIA 337										
SIA 338										
SIA 339										
SIA 340										
SIA 341										
SIA 342										
SIA 343										
SIA 344										
SIA 345										
SIA 346										
SIA 347										
SIA 348										

CO AUDIBLE (NIGHT) - LINES 8-1

CO LINES	BIT NUMBER	8	7	6	5	4	3	2	1	HEX FF
DEFAULT		1	1	1	1	1	1	1	0	1
SIA 301										
SIA 302										
SIA 303										
SIA 304										
SIA 305										
SIA 306										
SIA 307										
SIA 308										
SIA 309										
SIA 310										
SIA 311										
SIA 312										
SIA 313										
SIA 314										
SIA 315										
SIA 316										
SIA 317										
SIA 318										
SIA 319										
SIA 320										
SIA 321										
SIA 322										
SIA 323										
SIA 324										

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PROGRAM S: ST OPTS (STATION OPTIONS)

CO AUDIBLE (NIGHT) - LINES 16-9

CO LINES	BIT NUMBER	16	15	14	13	12	11	10	9	HEX FF
DEFAULT		1	1	1	1	1	2	1	0	
STA 325										
STA 326										
STA 327										
STA 328										
STA 329										
STA 330										
STA 331										
STA 332										
STA 333										
STA 334										
STA 335										
STA 336										
STA 337										
STA 338										
STA 339										
STA 340										
STA 341										
STA 342										
STA 343										
STA 344										
STA 345										
STA 346										
STA 347										
STA 348										

CO AUDIBLE (NIGHT) - LINES 16-9

CO LINES	BIT NUMBER	16	15	14	13	12	11	10	9	HEX FF
DEFAULT		1	1	1	1	1	2	1	0	
STA 301										
STA 302										
STA 303										
STA 304										
STA 305										
STA 306										
STA 307										
STA 308										
STA 309										
STA 310										
STA 311										
STA 312										
STA 313										
STA 314										
STA 315										
STA 316										
STA 317										
STA 318										
STA 319										
STA 320										
STA 321										
STA 322										
STA 323										
STA 324										

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April 1985

PROGRAM 5: ST OPTS (STATION OPTIONS)

Sub-Field: CO INC DY 8..1
CO INC DY 16..9

Access:

The CO INC DY sub-fields are accessed after the CO AUD NT 16..9 sub-field is programmed. The CO INC DY 16..9 sub-field is accessed after the CO INC DY 8..1 sub-field is programmed.

Description:

The CO INC DY sub-fields assign the lines that can be answered by the station during the day.

Instructions:

On the CO Incoming Day bit graph, place a 1 below each line that the station should be able to answer during the day. Place a 0 below lines the station should not be able to answer. The 1s and 0s entered on the bit graph create an eight bit binary number. Use Table 4-1 to convert the eight bit binary number to a two bit hexadecimal number. The hex number is entered on Table 4-5.

Example:

If station 310 should be able to answer all lines within a sub-field during the day, place a 1 beneath each line on the bit graph. The resultant binary number 11111111 is converted to hex FF and entered on Table 4-5.

Default Value: FF

Conditions:

The incoming calls will not ring unless granted CO audible.

Related Programming:

- L: CO OPTS to program options for the line.
- S: ST OPTS (CO AUD DY) to provide ringing on all lines that can be answered.

Feature Reference:

Answering a Call
Split Ringing

PROGRAM S: ST OPTS (STATION OPTIONS)

CO INCOMING (DAY) - LINES 8-1

CO LINES	BIT NUMBER	DEFAULT	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	HEX FF
STA 325																			
STA 326																			
STA 327																			
STA 328																			
STA 329																			
STA 330																			
STA 331																			
STA 332																			
STA 333																			
STA 334																			
STA 335																			
STA 336																			
STA 337																			
STA 338																			
STA 339																			
STA 340																			
STA 341																			
STA 342																			
STA 343																			
STA 344																			
STA 345																			
STA 346																			
STA 347																			
STA 348																			

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CO INCOMING (DAY) - LINES 8-1

CO LINES	BIT NUMBER	DEFAULT	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	HEX FF
STA 301																			
STA 302																			
STA 303																			
STA 304																			
STA 305																			
STA 306																			
STA 307																			
STA 308																			
STA 309																			
STA 310																			
STA 311																			
STA 312																			
STA 313																			
STA 314																			
STA 315																			
STA 316																			
STA 317																			
STA 318																			
STA 319																			
STA 320																			
STA 321																			
STA 322																			
STA 323																			
STA 324																			

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PROGRAM 5: ST OPTS (STATION OPTIONS)

CO INCOMING (DAY) - LINES 16-9

CO LINES BIT NUMBER DEFAULT	16 7	15 6	14 5	13 4	12 3	11 2	10 1	9 0	HEX FF
STA 325	1	1							
STA 326									
STA 327									
STA 328									
STA 329									
STA 330									
STA 331									
STA 332									
STA 333									
STA 334									
STA 335									
STA 336									
STA 337									
STA 338									
STA 339									
STA 340									
STA 341									
STA 342									
STA 343									
STA 344									
STA 345									
STA 346									
STA 347									
STA 348									

CO INCOMING (DAY) - LINES 16-9

CO LINES BIT NUMBER DEFAULT	16 7	15 6	14 5	13 4	12 3	11 2	10 1	9 0	HEX FF
STA 301	1	1							
STA 302									
STA 303									
STA 304									
STA 305									
STA 306									
STA 307									
STA 308									
STA 309									
STA 310									
STA 311									
STA 312									
STA 313									
STA 314									
STA 315									
STA 316									
STA 317									
STA 318									
STA 319									
STA 320									
STA 321									
STA 322									
STA 323									
STA 324									

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April 1965

PROGRAM S: ST OPTS (STATION OPTIONS)

*Sub-Field: CO INC NT 8..1
CO INC NT 16..9*

Access:

The CO INC NT sub-fields are accessed after the CO INC DY 16..9 sub-field is programmed. The CO INC NT 16..9 sub-field is accessed after the CO INC NT 8..1 sub-field is programmed.

Description:

The CO INC NT sub-fields assign the lines that can be answered by the station when the system is in the night mode.

Instructions:

On the CO Incoming Night bit graph, place a 1 below each line that the station should be able to answer at night. Place a 0 below lines the station should not be able to answer. The 1s and 0s entered on the bit graph create an eight bit binary number. Use Table 4-1 to convert the eight bit binary number to a two bit hexadecimal number. The hex number is entered on Table 4-5.

Example:

If station 310 should be able to answer all lines within a sub-field when the system is in the night mode, place a 1 beneath each line on the bit graph. The resultant binary number 11111111 is converted to hex FF and entered on Table 4-5.

Default Value: FF

Conditions:

For installations that do not use external night audible speakers, night audible should be enabled so the lines that can be answered will ring.

Related Programming:

L: CO OPTS to program options for lines.
S: ST OPTS (CO AUD NT) to allow calls that can be answered to ring.

Feature Reference:

Answering a Call
Night Service
Split Ringing

PROGRAM S: ST OPTS (STATION OPTIONS)

CO INCOMING (NIGHT) - LINES 8-1

CO LINES BIT NUMBER DEFAULT	8	7	6	5	4	3	2	1	HEX FF
STA 325									
STA 326									
STA 327									
STA 328									
STA 329									
STA 330									
STA 331									
STA 332									
STA 333									
STA 334									
STA 335									
STA 336									
STA 337									
STA 338									
STA 339									
STA 340									
STA 341									
STA 342									
STA 343									
STA 344									
STA 345									
STA 346									
STA 347									
STA 348									

CO INCOMING (NIGHT) - LINES 8-1

CO LINES BIT NUMBER DEFAULT	8	7	6	5	4	3	2	1	HEX FF
STA 301									
STA 302									
STA 303									
STA 304									
STA 305									
STA 306									
STA 307									
STA 308									
STA 309									
STA 310									
STA 311									
STA 312									
STA 313									
STA 314									
STA 315									
STA 316									
STA 317									
STA 318									
STA 319									
STA 320									
STA 321									
STA 322									
STA 323									
STA 324									

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PROGRAM S: ST OPTS (STATION OPTIONS)

CO INCOMING (NIGHT) - LINES 16-9

CO LINES	BIT NUMBER	16	15	14	13	12	11	10	9	HEX FF
DEFAULT		1	1	1	1	1	2	1	0	
STA 325										
STA 326										
STA 327										
STA 328										
STA 329										
STA 330										
STA 331										
STA 332										
STA 333										
STA 334										
STA 335										
STA 336										
STA 337										
STA 338										
STA 339										
STA 340										
STA 341										
STA 342										
STA 343										
STA 344										
STA 345										
STA 346										
STA 347										
STA 348										

CO INCOMING (NIGHT) - LINES 16-9

CO LINES	BIT NUMBER	16	15	14	13	12	11	10	9	HEX FF
DEFAULT		1	1	1	1	1	2	1	0	
STA 301										
STA 302										
STA 303										
STA 304										
STA 305										
STA 306										
STA 307										
STA 308										
STA 309										
STA 310										
STA 311										
STA 312										
STA 313										
STA 314										
STA 315										
STA 316										
STA 317										
STA 318										
STA 319										
STA 320										
STA 321										
STA 322										
STA 323										
STA 324										

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PROGRAM 5: ST OPTS (STATION OPTIONS)

Sub-Field: CO OUT DY 8..1
CO OUT DY 16..9

Access:

The CO OUT DY sub-fields are accessed after the CO ENC NT 16..9 sub-field is programmed. The CO OUT DY 16..9 sub-field is accessed after the CO OUT DY 8..1 sub-field is programmed.

Description:

Stations can be programmed to place outgoing calls on specified lines during day hours.

Instructions:

On the CO OUTWARD DAY bit graph, place a 1 below each line that the station can dial out on. Place a 0 below all other lines. The 1s and 0s entered create an eight bit binary number. Using Table 4-1, convert this binary number to its two digit hexadecimal equivalent. Enter the hex number on Table 4-5.

Example:

If station 315 should be able to place a call on every outside line within a sub-field, place a 1 beneath each line on the bit graph. The resultant binary number 11111111 is converted to hex FF. The hex number is entered on Table 4-5.

Default Value: FF

Conditions:

- (a) Toll Restriction may be imposed on outgoing calls.
- (b) Outgoing access may be granted for lines that cannot be answered and do not ring.

Related Programming:

- T: TOLL RES. to impose dialing restrictions on outgoing calls.
- L: CO OPTS to program available lines.
- S: ST OPTS (COS LINE) to assign a Class of Service to each outgoing line.

Feature Reference:

- Class of Service
- Placing a Call
- Split Ringing
- Toll Restriction

PROGRAM S: ST OPTS (STATION OPTIONS)

CO OUTGOING (DAY) - LINES 8-1

CO LINES	BIT NUMBER	DEFAULT	8	7	6	5	4	3	2	1	HEX FF
STA 325											
STA 326											
STA 327											
STA 328											
STA 329											
STA 330											
STA 331											
STA 332											
STA 333											
STA 334											
STA 335											
STA 336											
STA 337											
STA 338											
STA 339											
STA 340											
STA 341											
STA 342											
STA 343											
STA 344											
STA 345											
STA 346											
STA 347											
STA 348											

CO OUTGOING (DAY) - LINES 8-1

CO LINES	BIT NUMBER	DEFAULT	8	7	6	5	4	3	2	1	HEX FF
STA 301											
STA 302											
STA 303											
STA 304											
STA 305											
STA 306											
STA 307											
STA 308											
STA 309											
STA 310											
STA 311											
STA 312											
STA 313											
STA 314											
STA 315											
STA 316											
STA 317											
STA 318											
STA 319											
STA 320											
STA 321											
STA 322											
STA 323											
STA 324											

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PROGRAM 5: ST OPTS (STATION OPTIONS)

CO OUTGOING (DAY) - LINES 16-9

CO LINES	BIT NUMBER	16	15	14	13	12	11	10	9	HEX FF
DEFAULT	7	1	1	1	1	1	1	1	0	
STA 325	7	1	1	1	1	1	1	1	0	
STA 326	7	1	1	1	1	1	1	1	0	
STA 327	7	1	1	1	1	1	1	1	0	
STA 328	7	1	1	1	1	1	1	1	0	
STA 329	7	1	1	1	1	1	1	1	0	
STA 330	7	1	1	1	1	1	1	1	0	
STA 331	7	1	1	1	1	1	1	1	0	
STA 332	7	1	1	1	1	1	1	1	0	
STA 333	7	1	1	1	1	1	1	1	0	
STA 334	7	1	1	1	1	1	1	1	0	
STA 335	7	1	1	1	1	1	1	1	0	
STA 336	7	1	1	1	1	1	1	1	0	
STA 337	7	1	1	1	1	1	1	1	0	
STA 338	7	1	1	1	1	1	1	1	0	
STA 339	7	1	1	1	1	1	1	1	0	
STA 340	7	1	1	1	1	1	1	1	0	
STA 341	7	1	1	1	1	1	1	1	0	
STA 342	7	1	1	1	1	1	1	1	0	
STA 343	7	1	1	1	1	1	1	1	0	
STA 344	7	1	1	1	1	1	1	1	0	
STA 345	7	1	1	1	1	1	1	1	0	
STA 346	7	1	1	1	1	1	1	1	0	
STA 347	7	1	1	1	1	1	1	1	0	
STA 348	7	1	1	1	1	1	1	1	0	

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CO OUTGOING (DAY) - LINES 16-9

CO LINES	BIT NUMBER	16	15	14	13	12	11	10	9	HEX FF
DEFAULT	7	1	1	1	1	1	1	1	0	
STA 301	7	1	1	1	1	1	1	1	0	
STA 302	7	1	1	1	1	1	1	1	0	
STA 303	7	1	1	1	1	1	1	1	0	
STA 304	7	1	1	1	1	1	1	1	0	
STA 305	7	1	1	1	1	1	1	1	0	
STA 306	7	1	1	1	1	1	1	1	0	
STA 307	7	1	1	1	1	1	1	1	0	
STA 308	7	1	1	1	1	1	1	1	0	
STA 309	7	1	1	1	1	1	1	1	0	
STA 310	7	1	1	1	1	1	1	1	0	
STA 311	7	1	1	1	1	1	1	1	0	
STA 312	7	1	1	1	1	1	1	1	0	
STA 313	7	1	1	1	1	1	1	1	0	
STA 314	7	1	1	1	1	1	1	1	0	
STA 315	7	1	1	1	1	1	1	1	0	
STA 316	7	1	1	1	1	1	1	1	0	
STA 317	7	1	1	1	1	1	1	1	0	
STA 318	7	1	1	1	1	1	1	1	0	
STA 319	7	1	1	1	1	1	1	1	0	
STA 320	7	1	1	1	1	1	1	1	0	
STA 321	7	1	1	1	1	1	1	1	0	
STA 322	7	1	1	1	1	1	1	1	0	
STA 323	7	1	1	1	1	1	1	1	0	
STA 324	7	1	1	1	1	1	1	1	0	

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PROGRAM S: ST OPTS (STATION OPTIONS)

*Sub-Field: CO OUT.NT 8..1
CO OUT.NT 16..9*

Access:

The CO OUT NT sub-fields are accessed after the CO OUT DY 16..9 sub-field is programmed. The CO OUT NT 16..9 sub-field is accessed after the CO OUT NT 8..1 sub-field is programmed.

Description:

Stations can be programmed to place outgoing calls on specified lines when the system is in the night mode.

Instructions:

On the CO OUTWARD NIGHT bit graph, place a 1 below each line that the station can dial out on when the system is in the night mode. Place a 0 below all other lines. The 1s and 0s entered create an eight bit binary number. Using Table 4-1, convert this binary number to its two digit hexadecimal equivalent. Enter the hex number on Table 4-5.

Example:

If station 315 should be able to place a call on every outside line within a sub-field during night hours (i.e., night mode activated), place a 1 beneath each line on the bit graph. The resultant binary number 11111111 is converted to hex FF. The hex number is entered on Table 4-5.

Default Value: FF

Conditions:

Toll Restriction may be imposed on outgoing calls.

Related Programming:

- T: TOLL RES. to impose dialing restrictions on outgoing calls.
- L: CO OPTS to program outgoing lines.
- S: ST OPTS (COS LINE) to assign the Class of Service for each outgoing line.

Feature Reference:

Class of Service
Placing a Call
Split Ringing
Toll Restriction

PROGRAM 5: ST OPTS (STATION OPTIONS)

CO OUTGOING (NIGHT) - LINES 8-1

CO LINES	BIT NUMBER	8	7	6	5	4	3	2	1	10 X 11
BIT NUMBER	DEFAULT	1	1	1	1	1	1	1	0	1
STA 325										
STA 326										
STA 327										
STA 328										
STA 329										
STA 330										
STA 331										
STA 332										
STA 333										
STA 334										
STA 335										
STA 336										
STA 337										
STA 338										
STA 339										
STA 340										
STA 341										
STA 342										
STA 343										
STA 344										
STA 345										
STA 346										
STA 347										
STA 348										

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CO OUTGOING (NIGHT) - LINES 8-1

CO LINES	BIT NUMBER	8	7	6	5	4	3	2	1	HEX FF
BIT NUMBER	DEFAULT	1	1	1	1	1	1	1	0	1
STA 301										
STA 302										
STA 303										
STA 304										
STA 305										
STA 306										
STA 307										
STA 308										
STA 309										
STA 310										
STA 311										
STA 312										
STA 313										
STA 314										
STA 315										
STA 316										
STA 317										
STA 318										
STA 319										
STA 320										
STA 321										
STA 322										
STA 323										
STA 324										

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PROGRAM S: ST OPTS (STATION OPTIONS)

CO OUTGOING (NIGHT) - LINES 16-9

CO LINES BIT NUMBER DEFAULT	16	15	14	13	12	11	10	9	HEX FF
STA 325	1	1	1	1	1	1	1	1	
STA 326									
STA 327									
STA 328									
STA 329									
STA 330									
STA 331									
STA 332									
STA 333									
STA 334									
STA 335									
STA 336									
STA 337									
STA 338									
STA 339									
STA 340									
STA 341									
STA 342									
STA 343									
STA 344									
STA 345									
STA 346									
STA 347									
STA 348									

CO OUTGOING (NIGHT) - LINES 16-9

CO LINES BIT NUMBER DEFAULT	16	15	14	13	12	11	10	9	HEX FF
STA 301	1	1	1	1	1	1	1	1	
STA 302									
STA 303									
STA 304									
STA 305									
STA 306									
STA 307									
STA 308									
STA 309									
STA 310									
STA 311									
STA 312									
STA 313									
STA 314									
STA 315									
STA 316									
STA 317									
STA 318									
STA 319									
STA 320									
STA 321									
STA 322									
STA 323									
STA 324									

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PROGRAM 5: ST OPTS (STATION OPTIONS)

Sub-Field: INT PG 7..0

Access:

This sub-field is accessed after the CO OUT NT 16..9 sub-field is programmed.

Description:

The system has seven page zones and All Page. Each station can be individually assigned to any combination of page zones and All Call Page.

Instructions:

On the Page Zone bit graph, place a 1 below each page zone that the station can receive. Place a 0 below all other zones. The 1s and 0s create an eight bit binary number. This binary number is converted to its two digit hexadecimal equivalent using Table 4-1. The hex resultant is entered on Table 4-5. The default values are shown on the Page Zone Received bit graph in the left side of the blocks.

Example:

If station 310 should receive paging for zones 4 through 7, place a 1 beneath 4 through 7 on the bit graph. The binary number 11110000 is converted to hex F0 and entered on Table 4-5.

Default Value:

Stations 1-7 are in zone 1 and All Call (Default = 03).
Stations 8-14 are in zone 2 and All Call (Default = 05).
Stations 15-21 are in zone 3 and All Call (Default = 09).
Stations 22-28 are in zone 4 and All Call (Default = 11).
Stations 29-35 are in zone 5 and All Call (Default = 21).
Stations 36-42 are in zone 6 and All Call (Default = 41).
Stations 43-48 are in zone 7 and All Call (Default = 81).

Conditions:

(a) The telephone instrument must have a speaker to be able to receive paging announcements.

(b) Depending on programming, the telephones may or may not receive a beep indicating that a page has been initiated.

Related Programming:

R: EXT RLY to activate external paging equipment, if installed.

F: FLGS (PG RCV BEEP) to enable/disable the Page beep.

Feature Reference:

Paging

PROGRAM S: ST OPTS (STATION OPTIONS)

PAGE ZONE RECEIVED

STATION NUMBER	ZONE 7	ZONE 6	ZONE 5	ZONE 4	ZONE 3	ZONE 2	ZONE 1	0 ALL CALL	BIT NO OR X
125									
126									
127									
128									
129									
130									
131									
132									
133									
134									
135									
136									
137									
138									
139									
140									
141									
142									
143									
144									
145									
146									
147									
148									

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PAGE ZONE RECEIVED

STATION NUMBER	ZONE 7	ZONE 6	ZONE 5	ZONE 4	ZONE 3	ZONE 2	ZONE 1	0 ALL CALL	BIT NO OR X
149									
150									
151									
152									
153									
154									
155									
156									
157									
158									
159									
160									
161									
162									
163									
164									
165									
166									
167									
168									
169									
170									

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PROGRAM 5: ST OPTS (STATION OPTIONS)

Sub-Field: INT CALL WTG

Access:

This sub-field is accessed after the ENT PG 7.0 sub-field is programmed.

Description:

The INT CALL WTG sub-field allows each station to be enabled for Internal Call Waiting signals. If this sub-field is enabled, Internal Call Waiting signals will be received.

Instructions:

On Table 4-5, enter Y if Internal Call Waiting signals should be received; N if not.

Example: not applicable

Default Value: NO

Conditions:

(a) If the station being programmed is designated as the operator, Internal Call Waiting signals can only be enabled or disabled in field F: FLGS (sub-field OP # INT CALL WT).

(b) Internal Call Waiting signals from the attendant or Hotline partner cannot be blocked by this sub-field.

Related Programming:

F: FLGS (OP # INT CALL WT) to program operators for Internal Call Waiting.

Feature Reference:

Call Waiting

Sub-Field: BGM

Access:

This sub-field is accessed after the ENT CALL WTG sub-field is programmed.

Description:

Background Music can be enabled or disabled on a station-by-station basis. If the BGM sub-field is enabled, Background Music is enabled for the station.

Instructions:

On Table 4-5, enter Y if the station should receive Background Music; N if not.

Example: not applicable

Default Value: YES

Conditions:

An external Background Music source must be installed.

Related Programming:

F: FLGS (MUS ON HLD) to enable or disable Music on Hold.

Feature Reference:

Background Music/Music on Hold

PROGRAM S: ST OPTS (STATION OPTIONS)

Sub-Field: CALL FWD

Access:

The CALL FWD sub-field is accessed after the BGM sub-field is programmed.

Description:

Call Forwarding can be enabled on a station-by-station basis. If the CALL FWD sub-field is enabled, the station has the capability to forward calls.

Instructions:

On Table 4-5, enter Y if the station should be able to forward calls; N if not.

Example: not applicable

Default Value: YES

Conditions:

The operator can cancel all Call Forwards.

Related Programming: not applicable

Feature Reference:

Call Forwarding

Sub-Field: HF

Access:

The HF sub-field is accessed after the CALL FWD sub-field is programmed.

Description:

Handsfree capability can be enabled on a station-by-station basis. If the HF sub-field is enabled, the station has Handsfree capability.

Instructions:

On Table 4-5, enter Y if the station is to have Handsfree capability; N if not.

Example: not applicable

Default Value: YES

Conditions:

The telephone instrument must be a multibutton, four button or display telephone. If Handsfree is inhibited, Handsfree CO calls and Monitor are not possible. Handsfree Answerback (on Intercom calls) is not affected.

Related Programming:

S: ST OPTS (TYPE) to determine telephone type.

Feature Reference:

Handsfree
Handsfree Answerback
Monitor

PROGRAM 5: ST OPTS (STATION OPTIONS)

Sub-Field: RCV BRG IN

Access:

The RCV BRG IN sub-field is accessed after the HF sub-field is programmed.

Description:

Stations can be individually programmed to block attendant Barge In. If the RCV BRG IN sub-field is enabled, Barge In is allowed. If the sub-field is disabled, Barge In is denied.

Instructions:

On Table 4-5, enter Y if attendant Barge In is allowed; N if denied.

Example: not applicable

Default Value: YES

Conditions: not applicable

Related Programming:

O: OPRS to assign operators.

Feature Reference:

Barge In

Sub-Field: CO CALL WTG

Access:

The CO CALL WTG sub-field is accessed after the RCV BRG IN sub-field is programmed.

Description:

Stations can be individually programmed to receive or block CO (outside) Call Waiting beeps. If this sub-field is enabled, CO Call Waiting beeps will be received.

Instructions:

On Table 4-5, enter Y if CO Call Waiting beeps should be received; N if not.

Example: not applicable

Default Value: YES

Conditions:

(a) CO Call Waiting can be disabled on a system wide basis in F: FLGS (CO CALL WT).

(b) A station must have CO audible enabled for a line in order to receive CO Call Waiting beeps (when a call comes in on that line).

(c) CO Call Waiting beeps from transferred calls are not enabled or disabled by this sub-field.

Related Programming:

F: FLGS (CO CALL WT) to enable/disable CO Call Waiting on a system wide basis.

C: TMRS (CO CALL WTG) to program the interval between CO Call Waiting beeps.

S: ST OPTS (CO AUD DY, CO AUD NT) to enable audible for lines.

Feature Reference:

Call Waiting, Outside

PROGRAM S: ST OPTS (STATION OPTIONS)

Sub-Field: UNIV NT ANS

Access:

The UNIV NT ANS sub-field is accessed after the CO CALL WTG sub-field is programmed.

Description:

Stations can be individually enabled or disabled for Universal Night Answer (UNA). Universal Night Answer allows stations to answer a line ringing at another station or over the paging system when the system is in the night mode.

Instructions:

On Table 4-5, enter Y if the station should be able to answer night mode calls ringing at another station or over the paging system; N if not.

Example: not applicable

Default Value: YES

Conditions:

(a) Night audible at nearby telephones or on the paging system must be granted for this sub-field to be meaningful.

(b) Lines must also be individually programmed for Universal Night Answer.

(c) One button, single line 2500 type and four button telephones can answer UNA calls by lifting the handset and dialing 69. Multibutton telephones must lift handset, press INT key and then dial 69.

(d) Night Mode CO audible and incoming access (i.e., night mode split ringing) can be enabled for UNA lines. This activates Assigned Night Answer.

Related Programming:

S: ST OPTS (CO AUD NT, CO INC NT) to deny night audible and access.

S: ST OPTS (TYPE EXT) to provide audible to the external paging equipment (if installed).

R: EXT RLY to enable external paging equipment (if installed).

L: CO OPTS (UNIV NT ANS) to program lines as UNA lines.

Feature Reference:

Night Service

L R
8-1
16-9

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Table 4-1 BINARY TO HEXADECIMAL CONVERSION CHART. EK-824/1232/1648

TO CONVERT	ENTER	TO CONVERT	ENTER	TO CONVERT	ENTER	TO CONVERT	ENTER
0000 0000	00	0100 0000	40	1000 0000	80	1100 0000	C0
0000 0001	01	0100 0001	41	1000 0001	81	1100 0001	C1
0000 0010	02	0100 0010	42	1000 0010	82	1100 0010	C2
0000 0011	03	0100 0011	43	1000 0011	83	1100 0011	C3
0000 0100	04	0100 0100	44	1000 0100	84	1100 0100	C4
0000 0101	05	0100 0101	45	1000 0101	85	1100 0101	C5
0000 0110	06	0100 0110	46	1000 0110	86	1100 0110	C6
0000 0111	07	0100 0111	47	1000 0111	87	1100 0111	C7
0000 1000	08	0100 1000	48	1000 1000	88	1100 1000	C8
0000 1001	09	0100 1001	49	1000 1001	89	1100 1001	C9
0000 1010	0A	0100 1010	4A	1000 1010	8A	1100 1010	CA
0000 1011	0B	0100 1011	4B	1000 1011	8B	1100 1011	CB
0000 1100	0C	0100 1100	4C	1000 1100	8C	1100 1100	CC
0000 1101	0D	0100 1101	4D	1000 1101	8D	1100 1101	CD
0000 1110	0E	0100 1110	4E	1000 1110	8E	1100 1110	CE
0000 1111	0F	0100 1111	4F	1000 1111	8F	1100 1111	CF
0001 0000	10	0101 0000	50	1001 0000	90	1101 0000	D0
0001 0001	11	0101 0001	51	1001 0001	91	1101 0001	D1
0001 0010	12	0101 0010	52	1001 0010	92	1101 0010	D2
0001 0011	13	0101 0011	53	1001 0011	93	1101 0011	D3
0001 0100	14	0101 0100	54	1001 0100	94	1101 0100	D4
0001 0101	15	0101 0101	55	1001 0101	95	1101 0101	D5
0001 0110	16	0101 0110	56	1001 0110	96	1101 0110	D6
0001 0111	17	0101 0111	57	1001 0111	97	1101 0111	D7
0001 1000	18	0101 1000	58	1001 1000	98	1101 1000	D8
0001 1001	19	0101 1001	59	1001 1001	99	1101 1001	D9
0001 1010	1A	0101 1010	5A	1001 1010	9A	1101 1010	DA
0001 1011	1B	0101 1011	5B	1001 1011	9B	1101 1011	DB
0001 1100	1C	0101 1100	5C	1001 1100	9C	1101 1100	DC
0001 1101	1D	0101 1101	5D	1001 1101	9D	1101 1101	DD
0001 1110	1E	0101 1110	5E	1001 1110	9E	1101 1110	DE
0001 1111	1F	0101 1111	5F	1001 1111	9F	1101 1111	DF
0010 0000	20	0110 0000	60	1010 0000	A0	1110 0000	E0
0010 0001	21	0110 0001	61	1010 0001	A1	1110 0001	E1
0010 0010	22	0110 0010	62	1010 0010	A2	1110 0010	E2
0010 0011	23	0110 0011	63	1010 0011	A3	1110 0011	E3
0010 0100	24	0110 0100	64	1010 0100	A4	1110 0100	E4
0010 0101	25	0110 0101	65	1010 0101	A5	1110 0101	E5
0010 0110	26	0110 0110	66	1010 0110	A6	1110 0110	E6
0010 0111	27	0110 0111	67	1010 0111	A7	1110 0111	E7
0010 1000	28	0110 1000	68	1010 1000	A8	1110 1000	E8
0010 1001	29	0110 1001	69	1010 1001	A9	1110 1001	E9
0010 1010	2A	0110 1010	6A	1010 1010	AA	1110 1010	EA
0010 1011	2B	0110 1011	6B	1010 1011	AB	1110 1011	EB
0010 1100	2C	0110 1100	6C	1010 1100	AC	1110 1100	EC
0010 1101	2D	0110 1101	6D	1010 1101	AD	1110 1101	ED
0010 1110	2E	0110 1110	6E	1010 1110	AE	1110 1110	EE
0010 1111	2F	0110 1111	6F	1010 1111	AF	1110 1111	EF
0011 0000	30	0111 0000	70	1011 0000	B0	1111 0000	F0
0011 0001	31	0111 0001	71	1011 0001	B1	1111 0001	F1
0011 0010	32	0111 0010	72	1011 0010	B2	1111 0010	F2
0011 0011	33	0111 0011	73	1011 0011	B3	1111 0011	F3
0011 0100	34	0111 0100	74	1011 0100	B4	1111 0100	F4
0011 0101	35	0111 0101	75	1011 0101	B5	1111 0101	F5
0011 0110	36	0111 0110	76	1011 0110	B6	1111 0110	F6
0011 0111	37	0111 0111	77	1011 0111	B7	1111 0111	F7
0011 1000	38	0111 1000	78	1011 1000	B8	1111 1000	F8
0011 1001	39	0111 1001	79	1011 1001	B9	1111 1001	F9
0011 1010	3A	0111 1010	7A	1011 1010	BA	1111 1010	FA
0011 1011	3B	0111 1011	7B	1011 1011	BB	1111 1011	FB
0011 1100	3C	0111 1100	7C	1011 1100	BC	1111 1100	FC
0011 1101	3D	0111 1101	7D	1011 1101	BD	1111 1101	FD
0011 1110	3E	0111 1110	7E	1011 1110	BE	1111 1110	FE
0011 1111	3F	0111 1111	7F	1011 1111	BF	1111 1111	FF

Table 4-2 SYSTEM OPTIONS - PROGRAM RECORD FORM, EK-824/1232/1648 (Page 1 of 4)

FIELD DESCRIPTION	DEFAULT ENTRY	PROGRAM ENTRY	FIELD DESCRIPTION	DEFAULT ENTRY	PROGRAM ENTRY
O: Operator			F: Flags		
OP 1	1		MUS ON HLD	NO	
2 PRT DSS (DS1) OP 1	NONE		OP 1 BRG IN	NO	
2 PRT DSS (DS2) OP 1	NONE		OP 2 BRG IN	NO	
1 PRT DSS (DS3) OP 1	NONE		SEL CO/INT RNG	NO	
ALT OP 1	NONE		CO DRP ENA	NO	
OP 2	NONE		CO CALL WT	YES	
2 PRT DSS (DS1) OP 2	NONE		OP 1 INT CALL WT	YES	
2 PRT DSS (DS2) OP 2	NONE		OP 2 INT CALL WT	YES	
1 PRT DSS (DS3) OP 2	NONE		CO SEARCH	YES	
ALT OP 2	NONE		RNG INT CALLS	NO	
			SMDR INC	YES	
K: Tenants			SMDR RNA	YES	
TNNT 1 LAST CO	16		SMDR PBX	YES	
TNNT 1 LAST ST	48		SMDR LOC	YES	
TNNT 1 LAST BIN	80		SMDR LID	YES	
			SMDR BLOCKED	YES	
C: Timers			PG RCV BEEP	YES	
HLD RCL ST	60		PRV TONES	NO	
HLD RCL OP	60		TCX-128 KSU	NO	
FLSH 100 MS	10		MIC OFF IF DIALING	YES	
PAUSE	6				
XFER	30		G: Line Groups		
DIAL TONE	2		DIAL 9 GRP	1	
SMDR OTG	30		MEM DIAL GRP	1	
SMDR INC	6				
CO CALL WTG	30		L: CO Line Options		
REG FRST DIG	15		LINE 0'		
REG SBSC DIG	6		GROUP		
MIN RNG BRST 100MS	4		PULSE	NO	
MAX RNG IDLE 100MS	60		BEHIND PBX	NO	
MIN DRP PLSE 100MS	6		1- DIALING	YES	
BRK MS	61		BUSY OUT	NO	
MAKE MS	39		JNIV NT ANS	NO	
INTRDG = PER	10		10- DIALING	NO	
DTMF SPC DIAL 10 MS	6				
DTMF MAN DIAL 10 MS	12				
PRV TONE	10				
ALT OP XFER	30				

Table 4-2 SYSTEM OPTIONS - PROGRAM RECORD FORM. EK-824/1232/1648 (Page 2 of 4)

FIELD DESCRIPTION	DEFAULT ENTRY	PROGRAM ENTRY	FIELD DESCRIPTION	DEFAULT ENTRY	PROGRAM ENTRY
LINE 02			LINE 07		
GROUP			GROUP		
PULSE	NO		PULSE	NO	
BEHIND PBX	NO		BEHIND PBX	NO	
1+ DIALING	YES		1+ DIALING	YES	
BUSY OUT	NO		BUSY OUT	NO	
UNIV NT ANS	NO		UNIV NT ANS	NO	
10+ DIALING	NO		10+ DIALING	NO	
LINE 03			LINE 08		
GROUP			GROUP		
PULSE	NO		PULSE	NO	
BEHIND PBX	NO		BEHIND PBX	NO	
1+ DIALING	YES		1+ DIALING	YES	
BUSY OUT	NO		BUSY OUT	NO	
UNIV NT ANS	NO		UNIV NT ANS	NO	
10+ DIALING	NO		10+ DIALING	NO	
LINE 04			LINE 09		
GROUP			GROUP		
PULSE	NO		PULSE	NO	
BEHIND PBX	NO		BEHIND PBX	NO	
1+ DIALING	YES		1+ DIALING	YES	
BUSY OUT	NO		BUSY OUT	NO	
UNIV NT ANS	NO		UNIV NT ANS	NO	
10+ DIALING	NO		10+ DIALING	NO	
LINE 05			LINE 10		
GROUP			GROUP		
PULSE	NO		PULSE	NO	
BEHIND PBX	NO		BEHIND PBX	NO	
1+ DIALING	YES		1+ DIALING	YES	
BUSY OUT	NO		BUSY OUT	NO	
UNIV NT ANS	NO		UNIV NT ANS	NO	
10+ DIALING	NO		10+ DIALING	NO	
LINE 06			LINE 11		
GROUP			GROUP		
PULSE	NO		PULSE	NO	
BEHIND PBX	NO		BEHIND PBX	NO	
1+ DIALING	YES		1+ DIALING	YES	
BUSY OUT	NO		BUSY OUT	NO	
UNIV NT ANS	NO		UNIV NT ANS	NO	
10+ DIALING	NO		10+ DIALING	NO	

Table 4-2 SYSTEM OPTIONS - PROGRAM RECORD FORM, EK-824/1232/1648 (Page 3 of 4)

FIELD DESCRIPTION	DEFAULT ENTRY	PROGRAM ENTRY	FIELD DESCRIPTION	DEFAULT ENTRY	PROGRAM ENTRY
LINE 12			LINE 16		
GROUP	*		GROUP	*	
PULSE	NC		PULSE	NC	
BEHIND PBX	NC		BEHIND PBX	NC	
1+ DIALING	YES		1+ DIALING	YES	
BUSY OUT	NC		BUSY OUT	NC	
UNIV NT ANS	NC		UNIV NT ANS	NC	
10+ DIALING	NC		10+ DIALING	NC	
LINE 13			E: External Zones (NOT USED)		
GROUP	*		R: External Relays		
PULSE	NC		RLY 1 NT RNG 8.1	00	
BEHIND PBX	NC		RLY 1 NT RNG 16.9	00	
1+ DIALING	YES		RLY 2 NT RNG 8.1	00	
BUSY OUT	NC		RLY 2 NT RNG 16.9	00	
UNIV NT ANS	NC		RLY 1 PG 7.0	00	
10+ DIALING	NC		RLY 2 PG 7.0	00	
LINE 14			RLY 1 MISC	00	
GROUP	*		RLY 2 MISC	00	
PULSE	NC				
BEHIND PBX	NC				
1+ DIALING	YES				
BUSY OUT	NC				
UNIV NT ANS	NC				
10+ DIALING	NC				
LINE 15					
GROUP	*				
PULSE	NC				
BEHIND PBX	NC				
1+ DIALING	YES				
BUSY OUT	NC				
UNIV NT ANS	NC				
10+ DIALING	NC				



Table 4-2 SYSTEM OPTIONS - PROGRAM RECCRD FORM. EK-824/1232/1648 (Page 4 of 4)

FIELD DESCRIPTION	DEFAULT ENTRY	PROGRAM ENTRY	FIELD DESCRIPTION	DEFAULT ENTRY	PROGRAM ENTRY
T: Toll Restriction			Y: PBX COS		
R: RES. NOS.			PBX CODE 1 COS S	00000001	
RES. NO 1 S	NCNE		PBX CODE 2 COS S	00000001	
RES. NO 2 S	NCNE		PBX CODE 3 COS S	00000001	
RES. NO 3 S	NONE		PBX CODE 4 COS S	00000001	
RES. NO 4 S	NONE		PBX CODE 5 COS S	00000001	
RES. NO 5 S	NONE		PBX CODE 6 COS S	00000001	
RES. NO 6 S	NONE		PBX CODE 7 COS S	00000001	
RES. NO 7 S	NONE		PBX CODE 8 COS S	00000001	
RES. NO 8 S	NONE		PBX CODE 9 COS S	00000001	
RES. NO 9 S	NONE		PBX CODE 10 COS S	00000001	
RES. NO 10 S	NONE				
A: '1+' RES. NOS. COS			O: OCC LOC NOS.		
1+ RES. NO. 1 COS IS	00000000		OCC LOC # 1 IS	NONE	
1+ RES. NO. 2 COS IS	00000000		OCC LOC # 2 S	NCNE	
1+ RES. NO. 3 COS IS	00000000		OCC LOC # 3 IS	NONE	
1+ RES. NO. 4 COS IS	00000000		OCC LOC # 4 IS	NONE	
1+ RES. NO. 5 COS IS	00000000		OCC LOC # 5 IS	NONE	
1+ RES. NO. 6 COS IS	00000000		OCC LOC # 6 IS	NCNE	
1+ RES. NO. 7 COS IS	00000000		OCC LOC # 7 IS	NONE	
1+ RES. NO. 8 COS IS	00000000		OCC LOC # 8 IS	NONE	
1+ RES. NO. 9 COS IS	00000000		OCC LOC # 9 IS	NCNE	
1+ RES. NO. 10 COS IS	00000000		OCC LOC # 10 IS	NCNE	
B: RES. NOS. COS			P: OCC EQ. ACCS. NOS.		
RES. NO. 1 COS IS	11111111		OCC EQ. ACCS 1 IS	NCNE	
RES. NO. 2 COS IS	11111111		OCC EQ. ACCS 2 S	NONE	
RES. NO. 3 COS IS	11111111		OCC EQ. ACCS 3 IS	NONE	
RES. NO. 4 COS IS	11111111		OCC EQ. ACCS 4 S	NONE	
RES. NO. 5 COS IS	11111111		OCC EQ. ACCS 5 IS	NCNE	
RES. NO. 6 COS IS	11111111		OCC EQ. ACCS 6 S	NCNE	
RES. NO. 7 COS IS	11111111		OCC EQ. ACCS 7 S	NONE	
RES. NO. 8 COS IS	11111111		OCC EQ. ACCS 8 S	NONE	
RES. NO. 9 COS IS	11111111		OCC EQ. ACCS 9 S	NONE	
RES. NO. 10 COS IS	11111111		OCC EQ. ACCS 10 S	NCNE	
X: PBX CODES			J: MISC		
PBX CODE 1 S	NONE		* 31 COS	
PBX CODE 2 S	NONE		* 32 COS	
PBX CODE 3 S	NONE		* 33 COS	
PBX CODE 4 S	NONE		* 34 COS	
PBX CODE 5 S	NONE		NO DDD DIGS	..	
PBX CODE 6 S	NONE		NO OCC ACC DIGS	6	
PBX CODE 7 S	NONE		NO SMDR ACC DIGS	10	
PBX CODE 8 S	NONE		NO DIGS LOC CALL	..	
PBX CODE 9 S	NONE				
PBX CODE 10 S	NCNE				

Table 4-3 NXX CLASS OF SERVICE (D: '1+' NXX: COS) (Page 1 of 6), EK-824/1232/1648

NXX	ALLOWED CLASS OF SERVICE								NXX	ALLOWED CLASS OF SERVICE								NXX	ALLOWED CLASS OF SERVICE							
	8	7	6	5	4	3	2	1		8	7	6	5	4	3	2	1		8	7	6	5	4	3	2	1
200								250																	300	
201								251																	301	
202								252																	302	
203								253																	303	
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248								298																	348	
249								299																	349	

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Table 4-3 NXX CLASS OF SERVICE (D: '1-' NXX: COS) (Page 2 of 6), EK-824/1232/1648

ALLOWED CLASS OF SERVICE										ALLOWED CLASS OF SERVICE										ALLOWED CLASS OF SERVICE									
NXX	3	7	6	5	4	3	2	1	NXX	3	7	6	5	4	3	2	1	NXX	3	7	6	5	4	3	2	1			
350									400									450											
351									401									451											
352									402									452											
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Table 4-3 NXX CLASS OF SERVICE (D: '1+' NXX: COS) (Page 3 of 6), EK-824/1232/1648

NXX	ALLOWED CLASS OF SERVICE								NXX	ALLOWED CLASS OF SERVICE								NXX	ALLOWED CLASS OF SERVICE									
	8	7	6	5	4	3	2	1		8	7	6	5	4	3	2	1		8	7	6	5	4	3	2	1		
500								550									600											
501								551									601											
502								552									602											
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523								573									623											
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Table 4-3 NXX CLASS OF SERVICE (D: 1-1 NXX: COS) (Page 4 of 6), EK-824/1232/1648

NXX	ALLOWED CLASS OF SERVICE							NXX	ALLOWED CLASS OF SERVICE							NXX	ALLOWED CLASS OF SERVICE							
	3	7	6	5	4	3	2		1	3	7	6	5	4	3		2	1	3	7	6	5	4	3
650								700																750
651								701																751
652								702																752
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668								718																768
669								719																769
670								720																770
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673								723																773
674								724																774
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697								747																797
698								748																798
699								749																799

Table 4-3 NXX CLASS OF SERVICE (D: '1+' NXX: COS) (Page 5 of 6), EK-824/1232/1648

NXX	ALLOWED CLASS OF SERVICE								NXX	ALLOWED CLASS OF SERVICE								NXX	ALLOWED CLASS OF SERVICE									
	8	7	6	5	4	3	2	1		8	7	6	5	4	3	2	1		8	7	6	5	4	3	2	1		
800								850									900											
801								851									901											
802								852									902											
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805								855									905											
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813								863									913											
814								864									914											
815								865									915											
816								866									916											
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818								868									918											
819								869									919											
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845								895									945											
846								896									946											
847								897									947											
848								898									948											
849								899									949											

Table 4-3 NXX CLASS OF SERVICE (D: T-1 NXX: COS) (Page 6 of 6). EK-824/1232/1648

NXX	ALLOWED CLASS OF SERVICE							
	3	7	6	5	4	3	2	1
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Table 4-4 NXX CLASS OF SERVICE (L: NXX: COS) (Page 1 of 6), EK-824/1232/1648

NXX	ALLOWED CLASS OF SERVICE									NXX	ALLOWED CLASS OF SERVICE									NXX	ALLOWED CLASS OF SERVICE										
	8	7	6	5	4	3	2	1			8	7	6	5	4	3	2	1			8	7	6	5	4	3	2	1			
200										250																					300
201										251																					301
202										252																					302
203										253																					303
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Table 4-4 NXX CLASS OF SERVICE (L: NXX: COS) (Page 2 of 6), EK-824/1232/1648

NXX	ALLOWED CLASS OF SERVICE									NXX	ALLOWED CLASS OF SERVICE									NXX	ALLOWED CLASS OF SERVICE								
	3	7	6	5	4	3	2	1			3	7	6	5	4	3	2	1			3	7	6	5	4	3	2	1	
350										400																	450		
351										401																		451	
352										402																		452	
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Table 4-4 NXX CLASS OF SERVICE (L: NXX: COS) (Page 3 of 6), EK-824/1232/1648

NXX	ALLOWED CLASS OF SERVICE									NXX	ALLOWED CLASS OF SERVICE									NXX	ALLOWED CLASS OF SERVICE									
	8	7	6	5	4	3	2	1			8	7	6	5	4	3	2	1			8	7	6	5	4	3	2	1		
500										550										600										
501										551											601									
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547										597											647									
548										598											648									
549										599											649									

Table 4-4 NXX CLASS OF SERVICE (L: NXX: COS) (Page 4 of 6), EK-824/1232/1648

NXX	ALLOWED CLASS OF SERVICE							NXX	ALLOWED CLASS OF SERVICE							NXX	ALLOWED CLASS OF SERVICE								
	3	7	5	5	4	3	2		1	3	7	5	5	4	3		2	1	3	7	5	5	4	3	2
650								700									750								
651								701									751								
652								702									752								
653								703									753								
654								704									754								
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660								710								760									
661								711								761									
662								712								762									
663								713								763									
664								714								764									
665								715								765									
666								716								766									
667								717								767									
668								718								768									
669								719								769									
670								720							770										
671								721							771										
672								722							772										
673								723							773										
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682								732						782											
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689								739						789											
690								740						790											
691								741						791											
692								742						792											
693								743						793											
694								744						794											
695								745						795											
696								746						796											
697								747						797											
698								748						798											
699								749						799											

Table 4-4 NXX CLASS OF SERVICE (L: NXX: COS) (Page 5 of 6), EK-824/1232/1648

NXX	ALLOWED CLASS OF SERVICE								NXX	ALLOWED CLASS OF SERVICE								NXX	ALLOWED CLASS OF SERVICE									
	8	7	6	5	4	3	2	1		8	7	6	5	4	3	2	1		8	7	6	5	4	3	2	1		
800								850									900											
801								851									901											
802								852									902											
803								853									903											
804								854									904											
805								855									905											
806								856									906											
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808								858									908											
809								859									909											
810								860									910											
811								861									911											
812								862									912											
813								863									913											
814								864									914											
815								865									915											
816								866									916											
817								867									917											
818								868									918											
819								869									919											
820								870									920											
821								871									921											
822								872									922											
823								873									923											
824								874									924											
825								875									925											
826								876									926											
827								877									927											
828								878									928											
829								879									929											
830								880									930											
831								881									931											
832								882									932											
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839								889									939											
840								890									940											
841								891									941											
842								892									942											
843								893									943											
844								894									944											
845								895									945											
846								896									946											
847								897									947											
848								898									948											
849								899									949											

Table 4-4 NXX CLASS OF SERVICE L: NXX: COS) (Page 5 of 6) EK-824/1232/1648

NXX	ALLOWED CLASS OF SERVICE						
	3	4	5	6	7	8	9
950							
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Table 4-5 STATION OPTIONS - PROGRAM RECORD FORM, EK-824/1232/1648

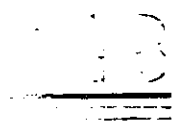
STA NO	POB1 ¹ HO	TYPE PHONE	HIGHLINE	CO AUD (DY)	CO AUD (NT)	CO INC (DY)	CO INC (NT)	CO OUT (DY)	CO OUT (NT)	INT ² PG	INT CALL WIG	BGM	CALL FWD	HF	RCV BRG IN	CO CALL WIG	UPJIV NT AUS
INITIALIZED		KEY		00 00	01 16 9	01 16 9	01 16 9	01 16 9	01 16 9	7 0	NO	YES	YES	YES	YES		YES
301	1									03							
302	2									03							
303	3									03							
304	4									03							
305	5									03							
306	6									03							
307	7									03							
308	8									05							
309	9									05							
310	10									05							
311	11									05							
312	12									05							
313	13									05							
314	14									05							
315	15									05							
316	16									09							
317	17									09							
318	18									09							
319	19									09							
420	20									09							
321	21									09							
322	22									11							
323	23									11							
324	24									11							
325	25									11							
326	26									11							
327	27									11							
328	28									11							
329	29									21							
330	30									21							
331	31									21							
332	32									21							
333	33									21							
334	34									21							
335	35									41							
336	36									41							
337	37									41							
338	38									41							
339	39									41							
340	40									41							
341	41									41							
342	42									41							
343	43									81							
344	44									81							
345	45									81							
346	46									81							
347	47									81							
348	48									81							

¹ Enter the post number to which the station is assigned if different from the initialized assignment ² Default assignments indicated in left side of each block

Table 4-6 STATION CLASS OF SERVICE. EK-324 1232 1648

STATION	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
301																
302																
303																
304																
305																
306																
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4



EK-824/1232/1648
ELECTRONIC KEY TELEPHONE SYSTEM
SECTION 5, INSTALLATION

CONTENTS	PAGE
1. INTRODUCTION	5-1
2. PREPARATION	5-1
TOOLS AND TEST EQUIPMENT	5-2
EQUIPMENT REQUIREMENTS	5-2
3. INSTALLATION	5-5
KSU AND POWER SUPPLY INSTALLATION .	5-6
STATION CABLING	5-10
INSTALLING PCBS	5-14
4. INSTALLING TELEPHONES	5-21
5. SYSTEM VOLTAGE CHECK	5-21
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8. RADIO FREQUENCY SUSCEPTIBILITY ...	5-25

1. INTRODUCTION

1.01 The INSTALLATION Section provides detailed procedures for installing the components of the system. Read this entire section. Installation of optional equipment is presented in Section 6 of this manual.

NOTE: Throughout this section, references within square brackets [] are applicable to the EK-824 and EK-1232 KSUs. References outside of the brackets are for the EK-1648 KSU. For example, J15 [J10] indicates that J15 is in the EK-1648 KSU and J10 is in the EK-824/1232 KSU.

2. PREPARATION

2.01 Before proceeding with installation, the installation site and telephone equipment must be verified.

2.02 The area for mounting the Key Service Unit (KSU) and related control equipment should be clean, dry, temperature controlled and not accessible to unauthorized personnel. The site should be away from static electricity (dry copiers), caustic chemicals and heavy machinery. There should be ample room to mount and maintain the equipment.

NOTE: Standard quad station cable (or equivalent) connects the station blocks to the telephone instruments. All station cable, including the DSS console, must be home run to the connecting blocks. Cable runs must not exceed 2000 feet for keysets, 10,000 feet for single line (2500 type) and one button sets and 800 feet for Display phones.

WARNING: OPERATION OF THIS EQUIPMENT OUTSIDE OF THESE LIMITS WILL DECREASE ITS EXPECTED RELIABILITY AND WILL VOID ANY APPLICABLE WARRANTY.

2.03 There must be a dedicated 3-wire 120 V AC (nominal), 60 Hz, 15 AMP circuit for the power supply. The outlet should be a three-prong receptacle (NEMA 5-15R). These receptacles must be within 8 feet (2.4m) of the power supply location.

NOTE: If an external paging amplifier or other external device is to be installed, it must be connected to an AC circuit other than the dedicated AC line.

2.04 An approved earth ground connection, in addition to the third wire ground, must be within 25 feet (7.6m) of the installation. The wire used for grounding the system must be 14 AWG or larger insulated wire. The ground wire should be as short as possible. A cold water pipe that is metallic throughout (including all joints and sections) will generally provide a suitable ground. Check the ground to ensure continuity. If a cold water piping system is found to be inadequate, an alternate grounding means must be used.

2.05 The operating telephone company must be notified of the proposed cut-over date and supplied with the information outlined in Section 1 of this manual. The telco lines, terminated in an RJ21X connector, must be within 25 feet (7.6m) of the KSU location.

2.06 Read this entire section and prepare a KSU installation layout similar to Figure 5-1. Customize the layout for the particular site application.

SITE SUMMARY CHECK

- *Location acceptable (para. 2.02).*
- *AC line(s) installed (para. 2.03).*
- *Provisions for ground (para. 2.04).*
- *Telco notified (para. 2.05).*
- *Telco lines available (para. 2.05).*
- *KSU installation layout prepared (para. 2.06).*

TOOLS AND TEST EQUIPMENT

2.07 In addition to the test equipment and tools usually used for a typical installation, the following items will be needed:

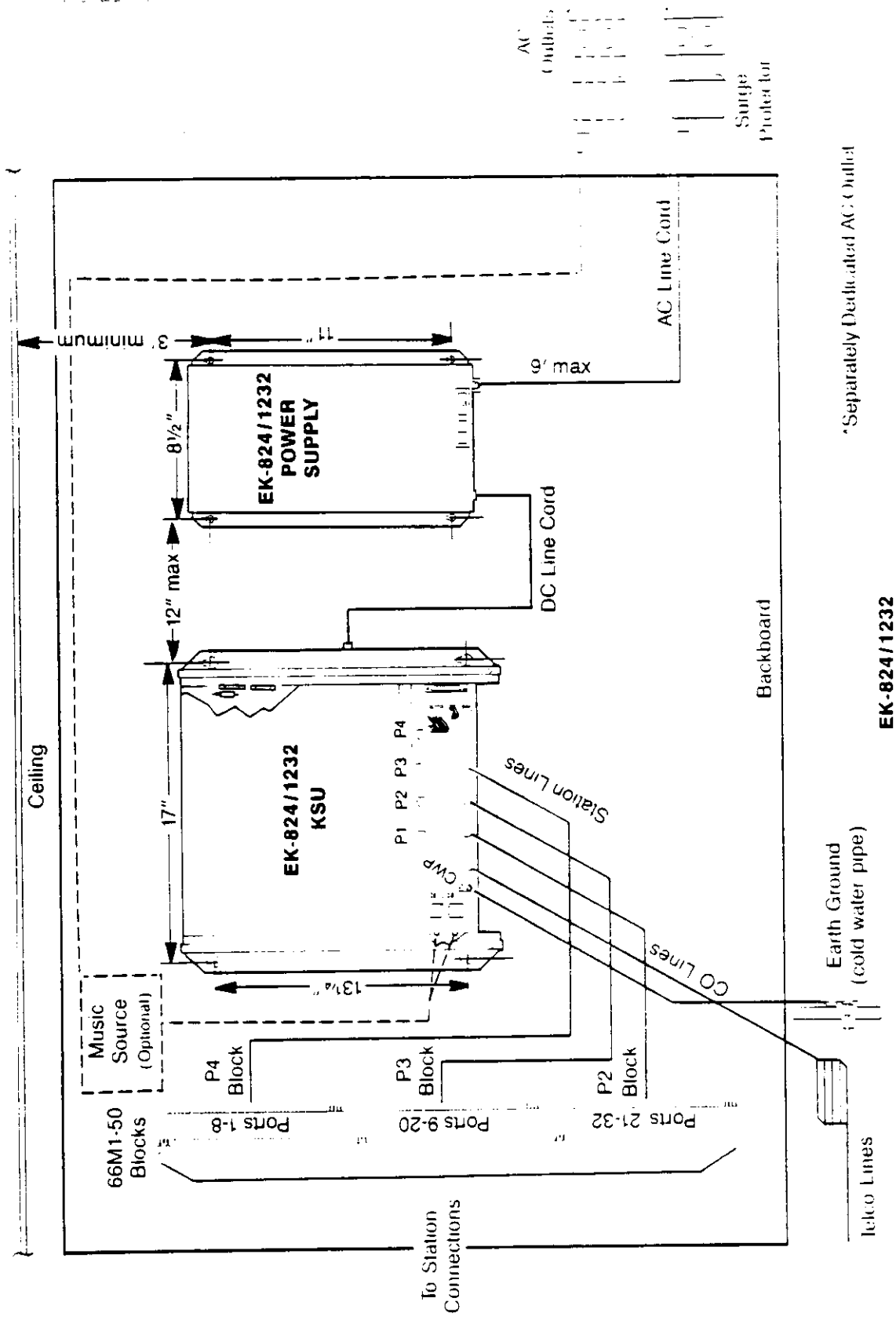
- (a) Digital voltmeter.
- (b) User-provided programming terminal.

EQUIPMENT REQUIREMENTS

2.08 Unpack the telephone equipment and compare the equipment received to a list of equipment ordered to ensure that all components are on site. Check for any physical damage. Verify the number and types of station instruments for the installation.

2.09 Have the necessary installation equipment (hardware and cables) available. This includes:

- (a) Exterior grade plywood backboard for mounting the KSU and power supply.
- (b) 25-pair cable for the telco connections.
- (c) Ground wire (14 AWG) for grounding the KSU.
- (d) Connecting blocks (66M1-50 type blocks with bridging clips) for cross connecting the station cable.
- (e) 25-pair cable (female on one end) for connecting the station blocks to the KSU.
- (f) Modular station jacks with screw type terminals (625A, 625F or equivalent) to connect the telephones to the telephone system.
- (g) 4-wire modular line cords for connecting the telephone instruments to the modular jacks.
- (h) A power line surge protector to guard the system against any sudden power surge.
- (i) Appropriate mounting equipment.
- (j) 25-pair cable for the telco to KSU connection with a type 57 connector (male on one end, female on the other).



*Separately Dedicated AC Outlet

EK-824/1232

Figure 5-1 TYPICAL SITE LAYOUT, EK-824/1232/1648 (Page 1 of 2)

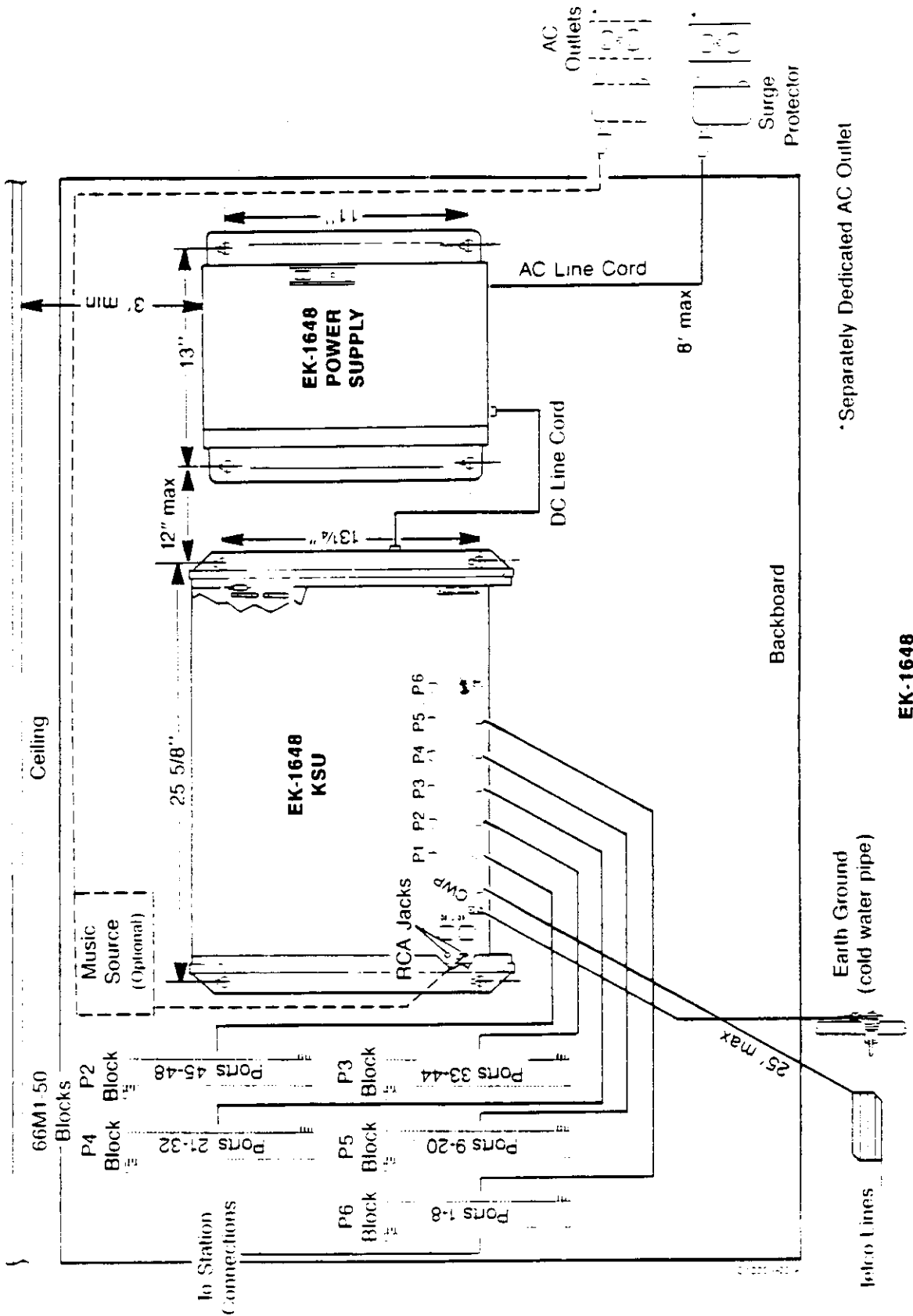


Figure 5-1 TYPICAL SITE LAYOUT, EK-824/1232/1648 (Page 2 of 2)

- 2.19 Before starting the installation, verify that the following documents are complete and on the premises:
- a) A building plan with stations marked as to location and type of telephone instrument.
 - b) The Order Sheet (Table 3-1) detailing equipment requirements.
 - c) The Program Record Forms (Table 4-2 - 4-6) with all programming information completed.

EQUIPMENT SUMMARY CHECK

- *Equipment present (para. 2.07 and 2.08).*
- *Hardware present (para. 2.09).*
- *Necessary documents on site (para. 2.10).*

3. INSTALLATION

3.01 The installation procedure (Table 3-1) is divided into three parts: KSU and Power Supply Installation, Station Cabling, and installing PCBs. Read the entire section before proceeding with the actual installation.

3.02 Alterations or modifications of this equipment not expressly shown in this installation manual are prohibited. If equipment malfunction is suspected, then disconnect your system from the telephone company lines by unplugging the telco RJ21X connector.

Table 5-1 INSTALLATION PROCEDURES, EK-824/1232/1648

<input type="checkbox"/>	1. CHECK INSTALLATION SITE (*2.01)
<input type="checkbox"/>	2. CHECK EQUIPMENT REQUIREMENTS (*2.07)
<input type="checkbox"/>	3. MOUNT BACKBOARD (*3.03)
<input type="checkbox"/>	4. INSTALL SURGE PROTECTOR (*3.05)
<input type="checkbox"/>	5. INSTALL POWER SUPPLY (*3.06)
<input type="checkbox"/>	6. MOUNT KSU (*3.09)
<input type="checkbox"/>	7. GROUND KSU (*3.10)
<input type="checkbox"/>	8. CONNECT POWER SUPPLY TO KSU (*3.11)
<input type="checkbox"/>	9. MOUNT 66M1-50 BLOCKS (*3.12)
<input type="checkbox"/>	10. CONNECT KSU TO BLOCKS (*3.12)
<input type="checkbox"/>	11. HOME RUN STATION CABLE (*3.13)
<input type="checkbox"/>	12. PUNCH DOWN STATION CABLE (*3.13)
<input type="checkbox"/>	13. INSTALL MODULAR JACKS (*3.15)
<input type="checkbox"/>	14. STRAP, SET SWITCHES AND INSTALL PCBs (*3.16)
<input type="checkbox"/>	15. INSTALL TELEPHONES (*4.01)
<input type="checkbox"/>	16. CHECK SYSTEM VOLTAGES (*5.01)
<input type="checkbox"/>	17. CONNECT TELCO LINES (*6.01)

KSU AND POWER SUPPLY INSTALLATION

3.03 Review the KSU installation layout prepared for the specific site. Locate the area for the plywood backboard on the wall. It should be at a convenient working height and within 8 feet (2.4m) of the dedicated AC receptacles.

3.04 Attach the plywood in the designated location with appropriate fasteners. Mark the equipment layout on the board using the installation layout drawing.

NOTE: The AC power cord on the power supply is only 8 feet (2.4m) long. Make sure that the location for the power supply is within 8 feet (2.4m) of the AC outlet, and within 12" (31cm) of the KSU.

WARNING: IF POWER SUPPLY IS LOCATED CLOSER THAN 3 FEET (0.9m) TO THE CEILING, IT MAY OVERHEAT.

3.05 Install a surge protector at the dedicated AC receptacle to minimize the effects of high static voltages, low level transients and line ripple. The protector should be a self-contained 3-prong grounded receptacle with a 15 AMP capacity. Connect this unit according to manufacturer's instructions.

BACKBOARD INSTALLATION CHECK

- Review site layout (para. 3.03).
- Mount backboard and mark equipment layout (para. 3.04).
- Install surge protector (para. 3.05).

Power Supply Installation

3.06 Mount the power supply (Figure 5-2) on the backboard in the proper location. This power supply is cooled by convection currents; therefore, it must be installed with the cables at the bottom of the unit.

- Mark four points on the backboard for the power supply that correspond to the mounting hole centers (Figure 5-1).
- Drill pilot holes at these points and insert suitable fasteners having a 1/4 inch shank diameter.
- Screw in fasteners until the clearance between the fastener head and the mounting surface is 1/4 inch.
- Mount the power supply on the four fasteners. Tighten each fastener until the power supply is securely attached to the mounting surface.

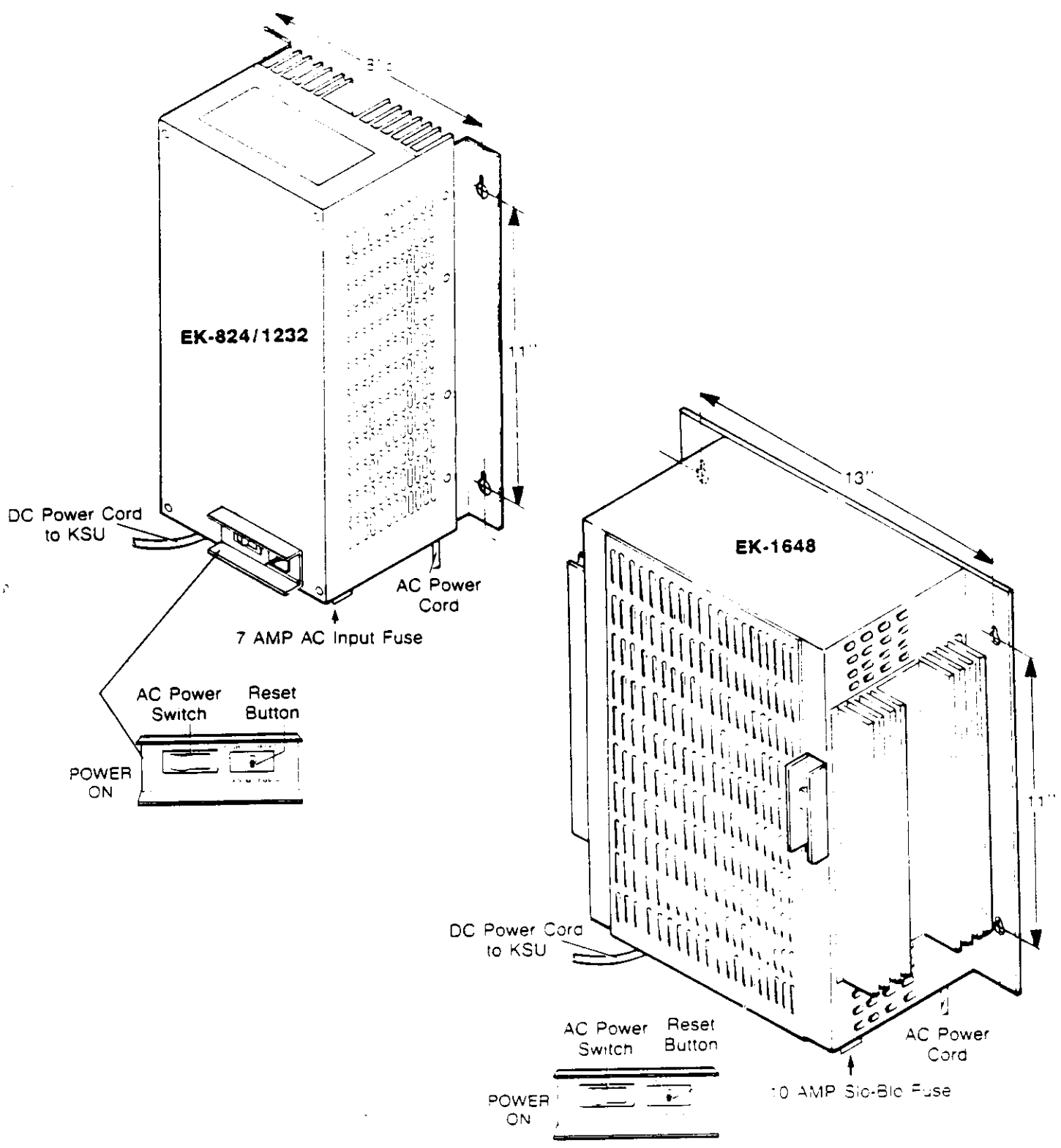


Figure 5-2 POWER SUPPLY, EK-824/1232/1648

3.07 A thermal protection device is located on the KSU (Figure 5-3). In systems using a B-PSU-A power supply, this device will automatically shut down all power supply outputs (via power supply connector pin 3) when the maximum operating temperature for the system is exceeded. When this temperature is exceeded in systems using the B-PSU-B or B-PSU-E power supply, the thermal protection device causes the reset button on the front face of the power supply to pop up, revealing a white band. This band indicates that the system is operating at dangerously high temperatures. The thermal protection device *will not* shut down the power on the B-PSU-B or B-PSU-E power supply.

Permanent Wiring Instructions

WARNING: DISCONNECT POWER SUPPLY FROM AC POWER SOURCE BEFORE MAKING ANY CHANGES.

3.08 In some installations it may be preferred to permanently wire the power supply, rather than plug it into a dedicated AC receptacle. If permanent wiring is required, follow the permanent wiring instructions on the tag attached to the power supply, and consult local and national codes.

NOTE: Permanent wiring must be done by a qualified electrician.

KSU Installation

3.09 Mount the KSU not more than 12 inches (31cm) to the left of the power supply as follows:

- Mark four points on the backboard that correspond to the mounting hole centers (Figure 5-1).
- Drill pilot holes at these points and insert suitable fasteners having a 1/4 inch shank diameter.
- Screw in fasteners until the clearance between the fastener head and the mounting surface is 1/4 inch.
- Mount KSU on the four fasteners and tighten each fastener until the KSU is securely attached to the mounting surface.

CAUTION: DO NOT INSTALL PCBs AT THIS POINT

3.10 Ground the KSU by connecting a stranded 14 AWG or heavier insulated copper wire from the KSU to a cold water pipe or other known ground. The ground wire should be as short as possible. Connect the ground wire to the grounding lug (CWP) on the KSU backplane (Figure 5-1). Use a grounding clamp on a cold water pipe or other known ground for the other end of the wire (Figure 5-1).

CAUTION: DO NOT ALTER CABLE WHICH CONNECTS POWER SUPPLY TO THE KSU. ALTERING CABLE WILL CHANGE LEAD RESISTANCE.

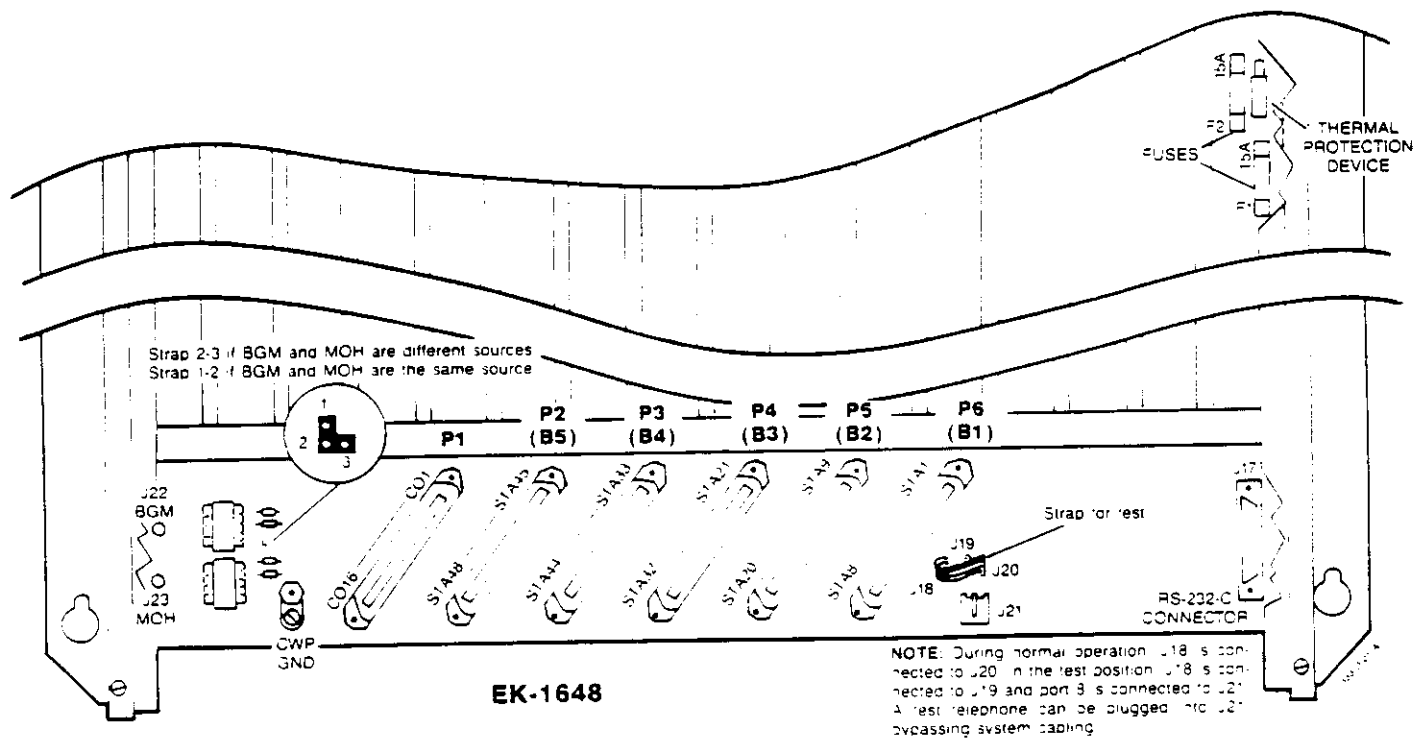
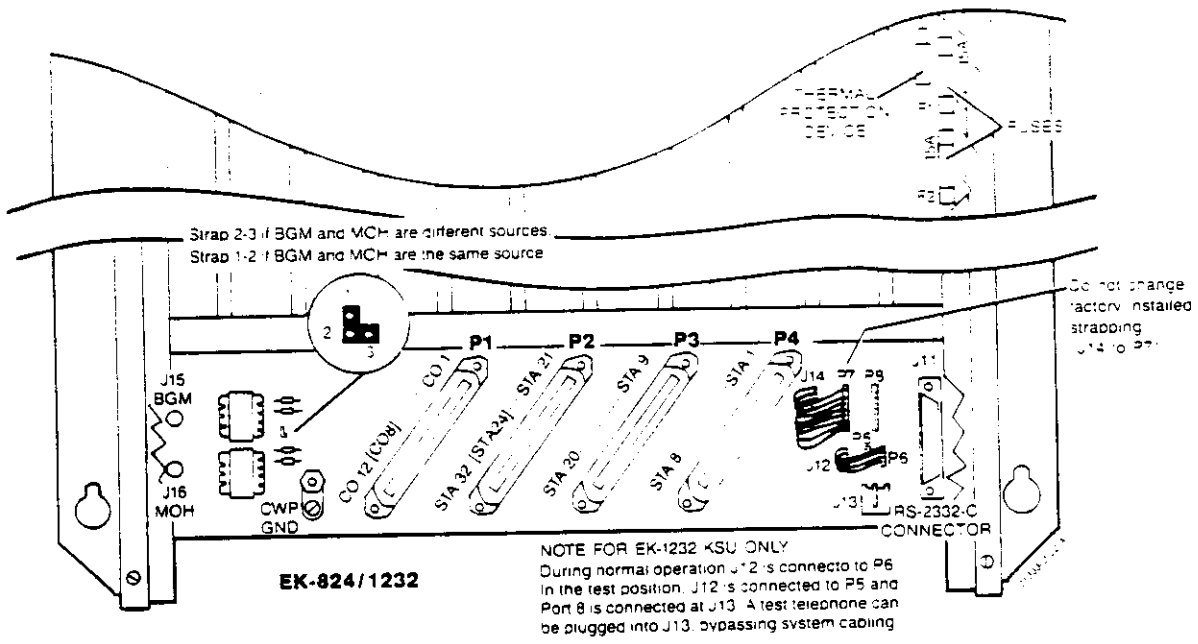


Figure 5-3 KSU CONNECTOR ASSIGNMENTS, EK-824/1232/1648

3.11 Connect the power supply to the KSU. The shorter multiconductor cable has a connector that plugs into the connector on the right side of the KSU. This connector is keyed to plug in only one way. Plug the power supply into the surge protector but **do not** turn it on.

3.12 Mount the 66M1-50 type connecting blocks to the left of the KSU (Figure 5-1). These blocks (also called station blocks) are used to connect the station cable. The number of blocks is dependent on the number of Station PCBs to be installed in the system (see Table 3-1). Connect each 25-pair cable (with type 57 female connector on one end) to the connecting blocks using Table 5-2 for station assignments. The female connector mates with the station (P) plugs on the KSU (Figure 5-3).

EQUIPMENT MOUNTING CHECK

- Mount power supply (para. 3.06-3.08).
- Mount KSU (para 3.09).
- Ground KSU (para. 3.10).
- Connect power supply to KSU (para. 3.11).
- Mount connecting blocks (para. 3.12).
- Wire KSU to station (connecting) blocks (para. 3.12).

STATION CABLING

3.13 Use standard station cable (or equivalent) to connect the connecting blocks to the modular jacks. All station cable, including cable for the DSS console, must be home run to the connecting blocks and must not exceed 2000 feet for keysets, 10,000 feet for (2500) type single line and one button sets and 800 feet for display telephones. Punch down the cable at the station blocks (Tables 5-2 and 5-3). Figure 5-4 shows typical station and single port (64 button) DSS console cabling.

3.14 Each dual port (56 button) DSS console requires 2 station positions, and is connected to the station blocks according to Tables 5-2 and 5-3, and Figure 5-5.

3.15 The cable is terminated at the station location in a 625A or 625F (4-wire) modular jack or equivalent. Modular jack assemblies should have screw-type terminals rather than the push-in type (Figure 5-6). Connect the RED, GRN, BLK and YEL conductors to the terminals. Each color matches the existing conductor color on each terminal. The telephone instruments are plugged into the modular jacks (Figure 5-7).

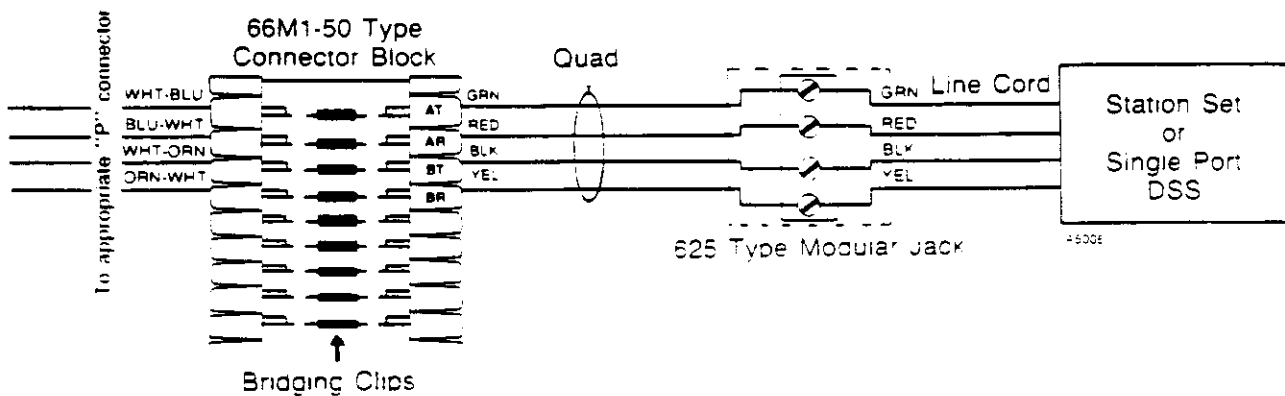


Figure 5-4 TYPICAL STATION AND SINGLE PORT (64 BUTTON) DSS CONSOLE CABLING. EK-824/1232/1648

Table 5-2 BLOCK CONNECTIONS. EK-824/1232/1643

EK-824/1232 KSU ONLY

25 Pair Cable		66M1-50	[P4]	P6	P5 [P3]	P4 [P2]	P3	P2	STA LEAD DESIG
Conn Pin	Color Code	Block Term							
25	WHT-BLU	1	Relay # 2	Relay # 2	AT AR PORT	AT AR PORT	AT AR PORT	AT AR PORT	GRN RED
27	BLU-WHT	2			BT 9	BT 21	BT 33	BT 45	BLK YEL
2	WHT-ORN	3	Relay # 1		BR J11 [J6]	BR J10 [J5]	BR J8	BR J7	
4	ORN-WHT	4							
28	WHT-GRN	5	NOT USED	NOT USED	AT AR PORT	AT AR PORT	AT AR PORT	AT AR PORT	GRN RED
3	GRN-WHT	5			BT 10	BT 22	BT 34	BT 46	BLK YEL
29	WHT-BRN	7			BR J11 [J6]	BR J10 [J5]	BR J8	BR J7	
4	BRN-WHT	8							
30	WHT-SLT	9	NOT USED		AT AR PORT	AT AR PORT	AT AR PORT	AT AR PORT	GRN RED
5	SLT-WHT	10		Relay # 1	BT 11	BT 23	BT 35	BT 47	BLK YEL
31	RED-BLU	11			BR J11 [J6]	BR J10 [J5]	BR J8	BR J7	
6	BLU-RED	12							
32	RED-ORN	13	NOT USED	AT AR PORT	AT AR PORT	AT AR PORT	AT AR PORT	AT AR PORT	GRN RED
7	ORN-RED	14		BT 1	BT 12	BT 24	BT 36	BT 48	BLK YEL
33	RED-GRN	15		BR J12	BR J11 [J6]	BR J10 [J5]	BR J8	BR J7	
8	GRN-RED	16							
34	RED-BRN	17	AT AR PORT	AT AR PORT	AT AR PORT	AT AR PORT	AT AR PORT	NOT USED	GRN RED
9	BRN-RED	18	BT 1	BT 2	BT 13	BT 25	BT 37		BLK YEL
35	RED-SLT	19	BR J7	BR J12	BR J11 [J6]	BR J9 [J4]	BR J8		
10	SLT-RED	20							
36	BLK-BLU	21	AT AR PORT	AT AR PORT	AT AR PORT	AT AR PORT	AT AR PORT	NOT USED	GRN RED
11	BLU-BLK	22	BT 2	BT 3	BT 14	BT 26	BT 38		BLK YEL
37	BLK-ORN	23	BR J7	BR J12	BR J11 [J6]	BR J9 [J4]	BR J8		
12	ORN-BLK	24							
38	BLK-GRN	25	AT AR PORT	AT AR PORT	AT AR PORT	AT AR PORT	AT AR PORT	NOT USED	GRN RED
13	GRN-BLK	26	BT 3	BT 4	BT 15	BT 27	BT 39		BLK YEL
39	BLK-BRN	27	BR J7	BR J12	BR J11 [J6]	BR J9 [J4]	BR J8		
14	BRN-BLK	28							
40	BLK-SLT	29	AT AR PORT	AT AR PORT	AT AR PORT	AT AR PORT	AT AR PORT	NOT USED	GRN RED
15	SLT-BLK	30	BT 4	BT 5	BT 16	BT 28	BT 40		BLK YEL
41	YEL-BLU	31	BR J7	BR J12	BR J11 [J6]	BR J9 [J4]	BR J8		
16	BLU-YEL	32							
42	YEL-ORN	33	AT AR PORT	AT AR PORT	AT AR PORT	AT AR PORT	AT AR PORT	NOT USED	GRN RED
17	ORN-YEL	34	BT 5	BT 6	BT 17	BT 29	BT 41		BLK YEL
43	YEL-GRN	35	BR J7	BR J12	BR J10 [J5]	BR J9 [J4]	BR J7		
18	GRN-YEL	36							
44	YEL-BRN	37	AT AR PORT	AT AR PORT	AT AR PORT	AT AR PORT	AT AR PORT	NOT USED	GRN RED
19	BRN-YEL	38	BT 6	BT 7	BT 18	BT 30	BT 42		BLK YEL
45	YEL-SLT	39	BR J7	BR J12	BR J10 [J5]	BR J9 [J4]	BR J7		
20	SLT-YEL	40							
46	VIO-BLU	41	AT AR PORT	AT AR PORT	AT AR PORT	AT AR PORT	AT AR PORT	NOT USED	GRN RED
21	BLU-VIO	42	BT 7	BT 8	BT 19	BT 31	BT 43		BLK YEL
47	VIO-ORN	43	BR J7	BR J12	BR J10 [J5]	BR J9 [J4]	BR J7		
22	ORN-VIO	44							
48	VIO-GRN	45	AT AR PORT	NOT USED	AT AR PORT	AT AR PORT	AT AR PORT	NOT USED	GRN RED
23	GRN-VIO	46	BT 8		BT 20	BT 32	BT 44		BLK YEL
49	VIO-BRN	47	BR J7		BR J10 [J5]	BR J9 [J4]	BR J7		
24	BRN-VIO	48							
50	VIO-SLT	49							
25	SLT-VIO	50							

EK-1648 KSU ONLY

EK-824/1232 designations shown inside square brackets

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FORM 1054

Table 5-3 CABLING AND VOLTAGES, EK-824/1232/1648

KEY TELEPHONE AND SINGLE PORT (64 BUTTON) DSS VOLTAGES			
COLOR	DESIG- NATION	FUNCTION	VOLTAGE
GRN	AT	DATA/POWER -	- 24 V DC
RED	AR	DATA/POWER +	- 24 V DC
BLK	BT	AUDIO	N/A
YEL	BR	AUDIO	N/A
DUAL PORT (56 BUTTON) DSS VOLTAGES			
COLOR	DESIG- NATION	FUNCTION	VOLTAGE
GRN	AT	DATA/POWER -	- 24 V DC
RED	AR	DATA/POWER -	- 24 V DC
BLK	AT'	DATA/POWER -	- 24 V DC
YEL	AR'	DATA/POWER -	- 24 V DC
SINGLE LINE TELEPHONE VOLTAGES			
COLOR	DESIG- NATION	FUNCTION	VOLTAGE
GRN	AT	AUDIO/POWER +	+ 24 V DC
RED	AR	AUDIO/POWER -	- 24 V DC
BLK	BT	GROUND	0 V DC
YEL	BR	RINGER POWER	+ 24 V DC

*Located in next consecutive station location.

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SYSTEM CABLING CHECK

- Home run all station cable (para. 3.13).
- Punch down cable at connecting blocks (para. 3.13-3.14).
- Terminate cable in modular jack at station locations (para. 3.15).

CAUTION: QUAD CABLE SHOULD BE ROUTED AWAY FROM ANY ELECTRO-MAGNETIC INTERFERENCE SOURCES SUCH AS ELECTRICAL MOTORS AND FLUORESCENT LIGHTS. ALL CABLE RUNS SHOULD BE AT LEAST 2 INCHES (50.8mm) FROM CONDUCTORS OF ANY ELECTRIC LIGHT, POWER OR CLASS 1 CIRCUIT. REFERENCE NATIONAL ELECTRICAL CODE, ARTICLE 800-COMMUNICATION CIRCUITS.

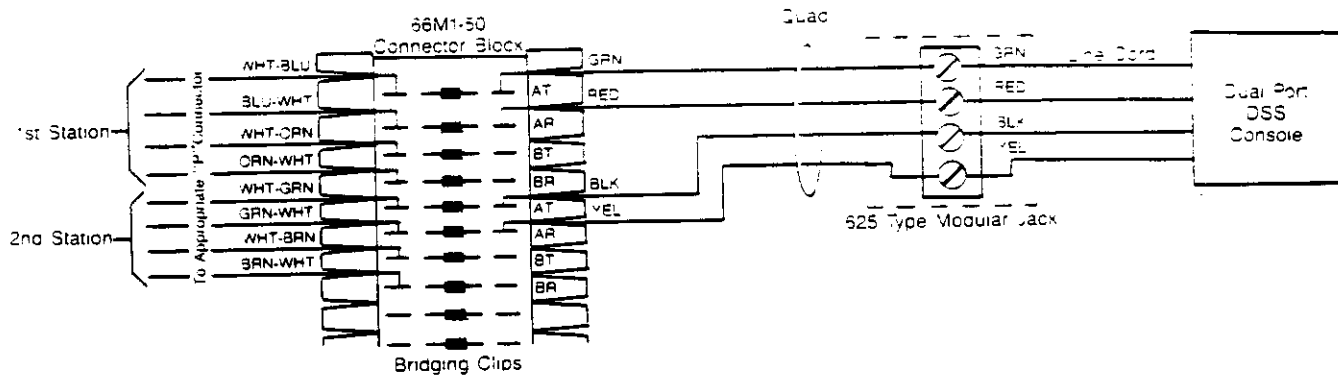


Figure 5-5 DUAL PORT (56 BUTTON) DSS CONSOLE CABLING, EK-824/1232/1648

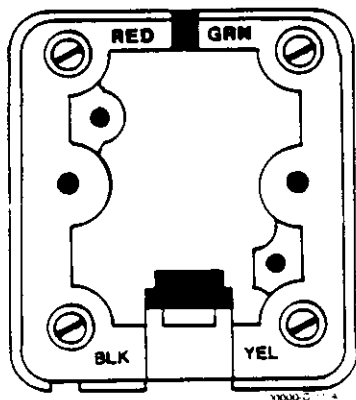


Figure 5-6 MODULAR JACK CONNECTOR, EK-824/1232/1648

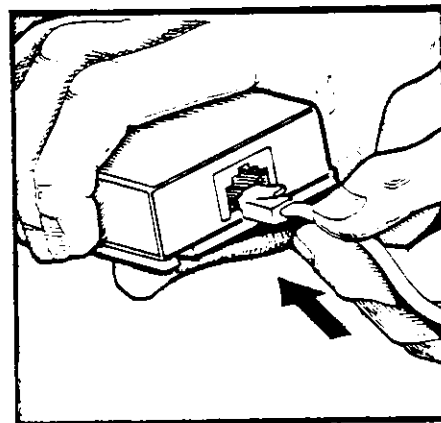


Figure 5-7 CORD CONNECTION, EK-824/1232/1648

INSTALLING PCBs

- 3.16 Verify that the installation is in accordance with this manual and Table 5-4.

WARNING: ALL POWER SHOULD BE OFF WHEN INSERTING PCBs.

Static Precautions

- 3.17 The Printed Circuit Boards (PCBs) are sensitive to static electricity. Use the proper precautions to guard against static damage. The next several paragraphs highlight safe handling techniques for static-sensitive equipment.
- 3.18 All PCBs should be handled in the conductive black velostat bags in which they were shipped.
- 3.19 To minimize static charges, three steps must be taken. First, discharge any accumulated body static by touching a grounded object. Second, wear a wrist ground strap attached to the CWP GND lug on the KSU. Finally, keep foot movement to a minimum.

- 3.20 Only surfaces or items that are at ground potential should come in contact with static-sensitive PCBs.

WARNING: WHEN INSTALLING, REMOVING OR MAINTAINING PCBs USE THE PROPER PRECAUTIONS TO GUARD AGAINST STATIC DAMAGE.

- 3.21 Handle PCBs carefully while slowly inserting or removing them from the KSU slot.

SYSTEM CHECK

- *System must be off.*
- *Read static precautions (para. 3.17 through 3.21).*

Table 5-4 INSTALLATION CHECKLIST, EK-824/1232/1648

INSTALLATION REQUIREMENTS	VERIFICATION
MOUNTING SURFACE	Check that exterior-grade plywood is used as the backboard on damp mounting surfaces.
AC LINE	Check that AC line is dedicated exclusively to the system.
SERVICE ENTRANCE PANEL	Check that circuit breaker switch is equipped with a lock-clip to Entrance Panel to prevent accidental shut-down.
POWER OUTLET	Check that power outlet is a 3-wire grounded outlet for receiving 115 V AC having parallel blades and ground pin. Do not use a 3-prong to 2-prong adapter. Check that input power line has the capacity to deliver 15 amperes (RMS).
SURGE PROTECTION	Check that Surge Protector is installed on input Power Line.
VENTILATION AND TEMPERATURE	Check that site is adequately ventilated with a temperature range of 40° F to 100° F (4° C to 38° C) and a humidity range of 5% to 95% relative, non condensing.
EARTH GROUND	Check that a proper earth ground connection is made using 14 AWG (or larger) wire.
SERVICEABILITY	Check that lighting conditions and the amount of working space are adequate for future servicing.
KSU	Check that the 1/4" KSU hanger bolts have been tightened sufficiently.
POWER SUPPLY	Check that the 1/4" power supply hanger bolts have been tightened sufficiently.
PUNCH DOWN BLOCK	Check that bridging clips have been installed.
FUSES	Check that fuse ratings for fuses on KSU backplane are correct.

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PCB Location

3.22 Use Figure 5-8 as reference for PCB location. Each PCB is keyed to fit only in its proper slot in the KSU backplane. When inserting the PCBs, the connector edge goes into the slot with the component side of the PCB to the installer's right. Use your thumbs to push the PCBs into the appropriate location (Figure 5-9). Push the PCB until firmly seated. Do not use the heel of your hand or any tool to push a PCB into a connector.

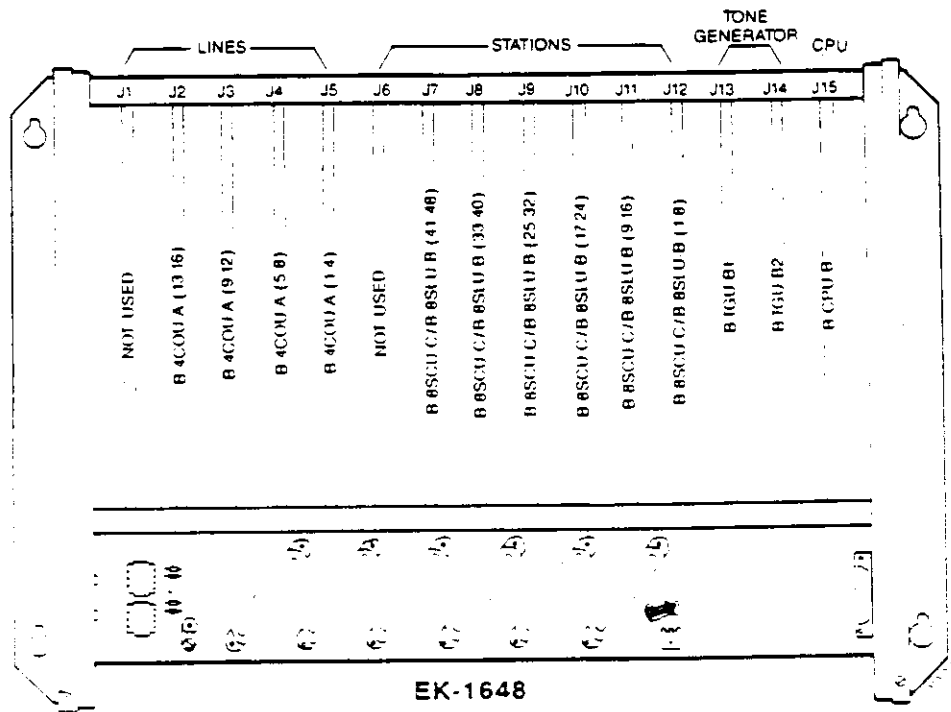
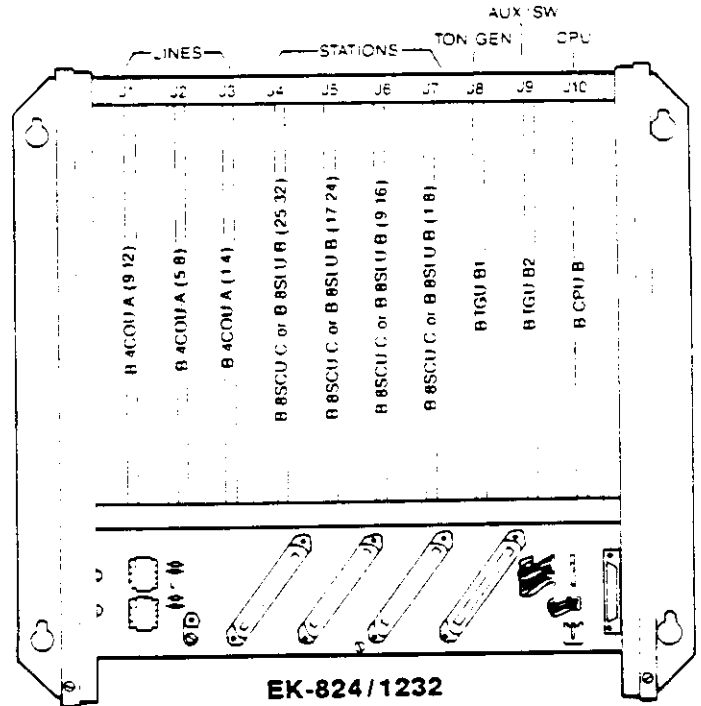


Figure 5-8 PCB LOCATION. EK-824/1232/1648

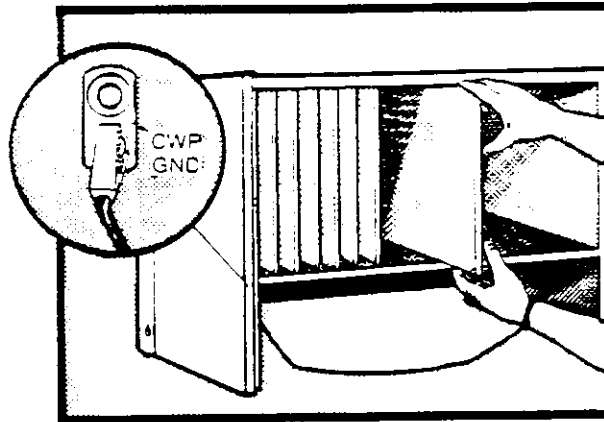


Figure 5-9 PCB INSERTION, EK-824/1232/1648

Central Processing Unit (B-CPU-B) PCB

3.23 Before the B-CPU-B PCB (Figure 5-10) is installed in the KSU (and before the system is programmed), the Baud Rate Switch (S2) must be set to match the baud rate of the programming terminal, and the Serial Data Switch (S3) must be set for data format compatibility.

- Strap the B-CPU-B PCB from E1 to E2 for battery backup. The NiCad battery on the B-CPU-B PCB will fully charge in 100 hours (about four days). Once fully charged, the battery will retain system memory for at least 10 days.
- To set the switches, refer to Figure 5-10.

3.24 A special clock/calendar is located on the B-CPU-B which allows the time and date to appear on all display telephones in the system and the SMDR. If a power outage occurs, this clock/calendar will stop, and must be reset when the power returns. If a more accurate accounting is required, an optional Real Time Clock Daughter Board should be installed on the B-TGU-B PCB (refer to paragraph 3.25).

- Make sure that all power is shut off before inserting PCBs. After the switches have been set, insert the CPU PCB in the KSU slot J15 (J10) (Figure 5-8).

CAUTION: MAKE SURE THE B-CPU-B PCB IS STRAPPED FROM E1 TO E2 (FIGURE 5-10). IF THE PCB IS NOT STRAPPED E1 TO E2 THE SYSTEM WILL INITIALIZE EACH TIME POWER IS TURNED ON OR OFF. INITIALIZATION RETURNS ALL PROGRAMMED ENTRIES TO DEFAULT.

SWITCH S2				
Baud Rate	Selector			
	2	3	4	
50	C	O	C	C
75	O	O	C	C
110	O	O	O	C
135	C	O	O	C
150	C	O	O	C
200	O	O	O	C
300	O	O	O	C
600	O	O	O	C
1200	O	O	O	C
1800	O	O	O	C
2400	O	O	O	C
4800	O	O	O	C
9600	C	C	C	C

Note: C equals the OPEN position on the selectors. O equals the closed position.

SERIAL DATA SWITCH (S3) SELECTOR							
1	2	3	4	5	6	7	8
						O	Parity Enable
						C	Parity Disable
						O	Parity Even
						C	Parity Odd
				O	O		Not Used
				O	C		1 Stop Bit
				C	O		1.5 Stop Bits
				C	C		2 Stop Bits
				X			Not Used
				C			7 Bits Per Char
				O			8 Bits Per Char
X	X						Not Used

Bit Number O = Open X = Don't Care
 C = Close

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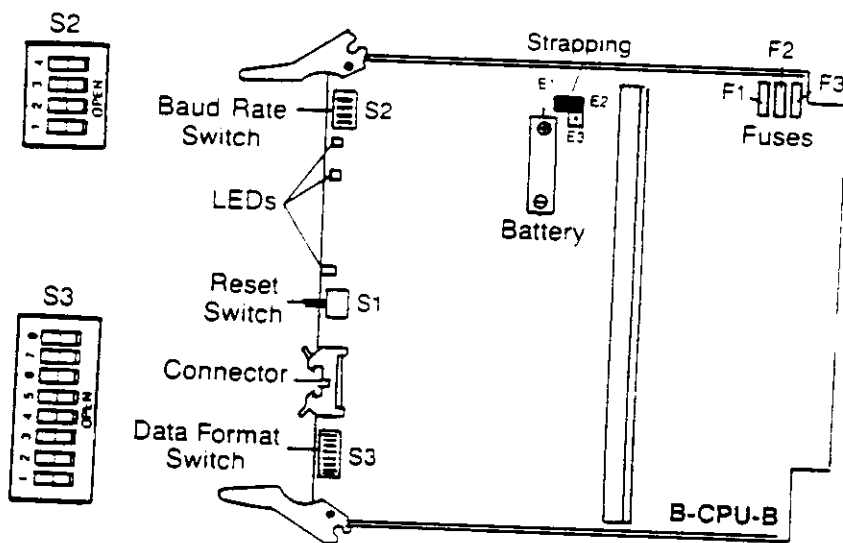


Figure 5-10 RESET, BAUD RATE AND SERIAL DATA SWITCH LOCATION, EK-824/1232/1648

Tone Generator (B-TGU-B) PCB

3.25 Up to two Tone Generator (B-TGU-B) PCBs (Figure 5-11) can be installed in the EK-1648 or EK-1232 KSL. A single B-TGU-B PCB can be installed in the EK-824 KSL. If additional DTMF receivers (Daughter Boards) are required, install them on the B-TGU-B PCB (Figure 5-12). If the battery backed-up Real Time Clock (B-RTC-A) is required, install it on the B-TGU-B PCB as shown in Figure 5-12. The B-RTC-A PCB has a two position jumper assembly (Figure 5-12). When a B-RTC-A PCB is installed on the Tone Generator PCB, this jumper must be strapped to the B side of connection. Strap the B-TGU-B PCB (Figure 5-11) according to the following:

- B-TGU-B POS. 1 (J13) [J8] STRAP E1 TO E2.
- B-TGU-B POS. 2 (J14) [J9] STRAP E1 TO E3.

NOTE: 19's are used in the EK-824 KSL.

- Mount the DTMF Receiver PCBs and the B-RTC-A PCB (if required) on the B-TGU-B PCB.
- After strapping the B-RTC-A and B-TGU-B PCBs, insert the B-TGU-B PCB in the correct position in the KSL (Figure 5-8).

NOTE: The NiCad battery on the B-RTC-A PCB will fully charge in 100 hours (about four days). If commercial power should fail, the B-RTC-A will continue to keep accurate time for approximately 100 hours.

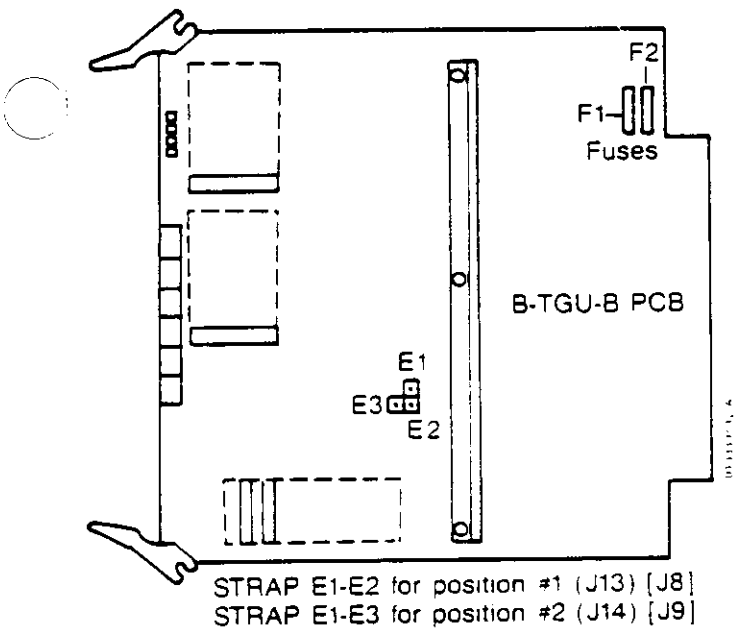


Figure 5-11 TONE GENERATOR (B-TGU-B) STRAPPING, EK-824/1232/1648

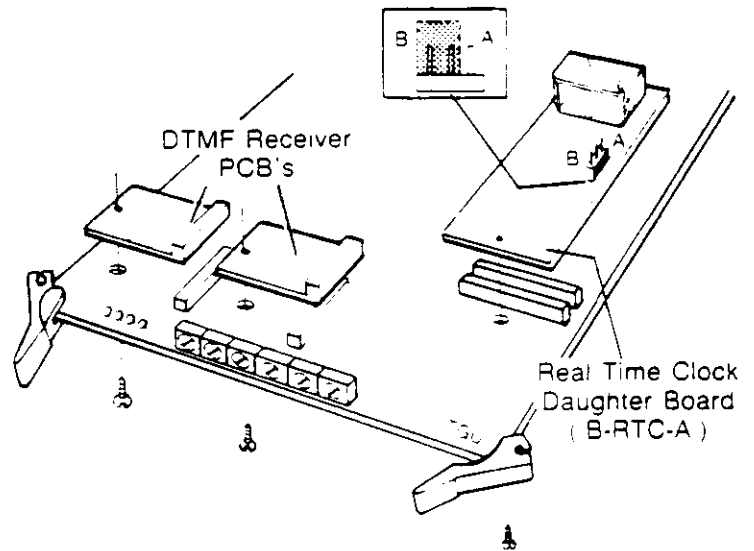


Figure 5-12 DTMF RECEIVER AND SMDR REAL TIME CLOCK DAUGHTER BOARD, EK-824/1232/1648

Station (B-8SCU-C) PCB

3.26 The Station PCBs (B-8SCU-C PCBs) do not require any strapping. Each PCB has eight station circuits. Refer to Figure 5-8 and the following table for PCB placement.

DEFAULT STATION	PORT NO.	KSU SLOT	KSU PLUG/BLOCK
301-308	1-8	J12 [J7]	P6 [P4]
309-316	9-16	J11 [J6]	P5 [P3]
317-320	17-20	J10 [J5]	P5 [P3]
321-324	21-24	J10 [J5]	P4 [P2]
325-332	25-32	J9 [J4]	P4 [P2]
333-340	33-40	J8	P3
341-344	41-44	J7	P3
345-348	45-48	J7	P2

EK-1648 only _____

- Insert the required number of Station PCBs for the system.

NOTE: [J4] is not used in the EK-824 KSU.

Single Line (B-8SLU-B) PCB

3.27 Single Line (B-8SLU-B) PCBs are required when single line (2500 type) or one button telephones are used in the system. Each PCB contains eight single line circuits and occupies one station PCB slot in the KSU. Each circuit on the B-8SLU-B PCB must be strapped to indicate the type of telephone being used. For 2500 type telephones, strap each circuit in the E1-E2 position (Figure 5-13). For One Button Telephones and OPX stations, strap each circuit in the E2-E3 position.

NOTE: Distinctive Ringing requires that the B-8SLU-B PCB have software version 177-114-02 or 177-114-03. The software level is indicated on the label attached to U13.

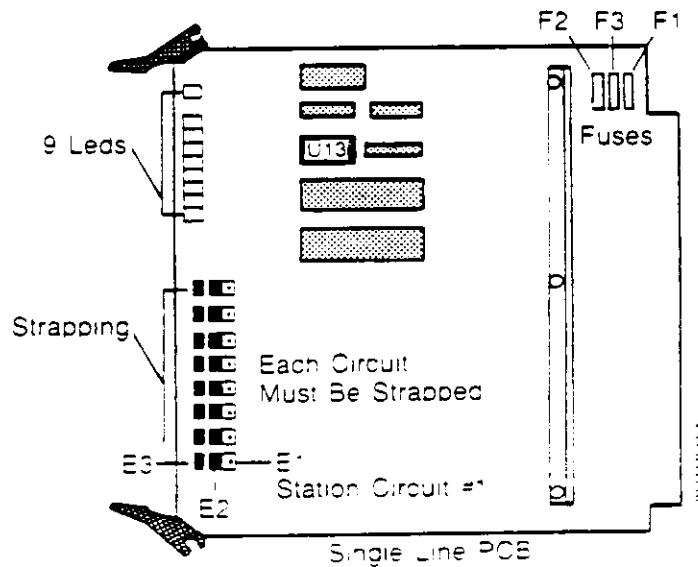


Figure 5-13 SINGLE LINE (B-8SLU-B) STRAPPING, EK-824/1232/1648

CO Line (B-4COU-A) PCB

3.28 The CO Line PCBs (B-4COU-A) do not require strapping. Each PCB contains 4 CO line circuits. Refer to Figure 5-8 and the following chart for PCB placement.

CO LINES	PCB SLOT
1 to 4	J 5 [J3]
5 to 8	J 4 [J2]
9 to 12	J 3 [J1]
13 to 16	J 2

- Insert the required number of CO Line (B-4COU-A) PCBs for the system.

NOTE: [J1] is not used in the EK-824 KSU.

KSU PCB CHECK

- Set switches and insert B-CPU-B PCB (para. 3.23 & 3.24).
- Strap and insert B-TGU-B PCBs (para. 3.25).
- Insert B-8SCU-C PCBs (para. 3.26).
- Strap and insert B-8SLU-B PCBs (para 3.27).
- Insert B-4COU-A PCBs (para. 3.28).

4. INSTALLING TELEPHONES

- 4.01 To install the telephone or console, simply plug the unit into the modular rack (Figure 5-7).
- 4.02 If wall mounting is required, refer to the instructions shipped with the wall mounting kits.

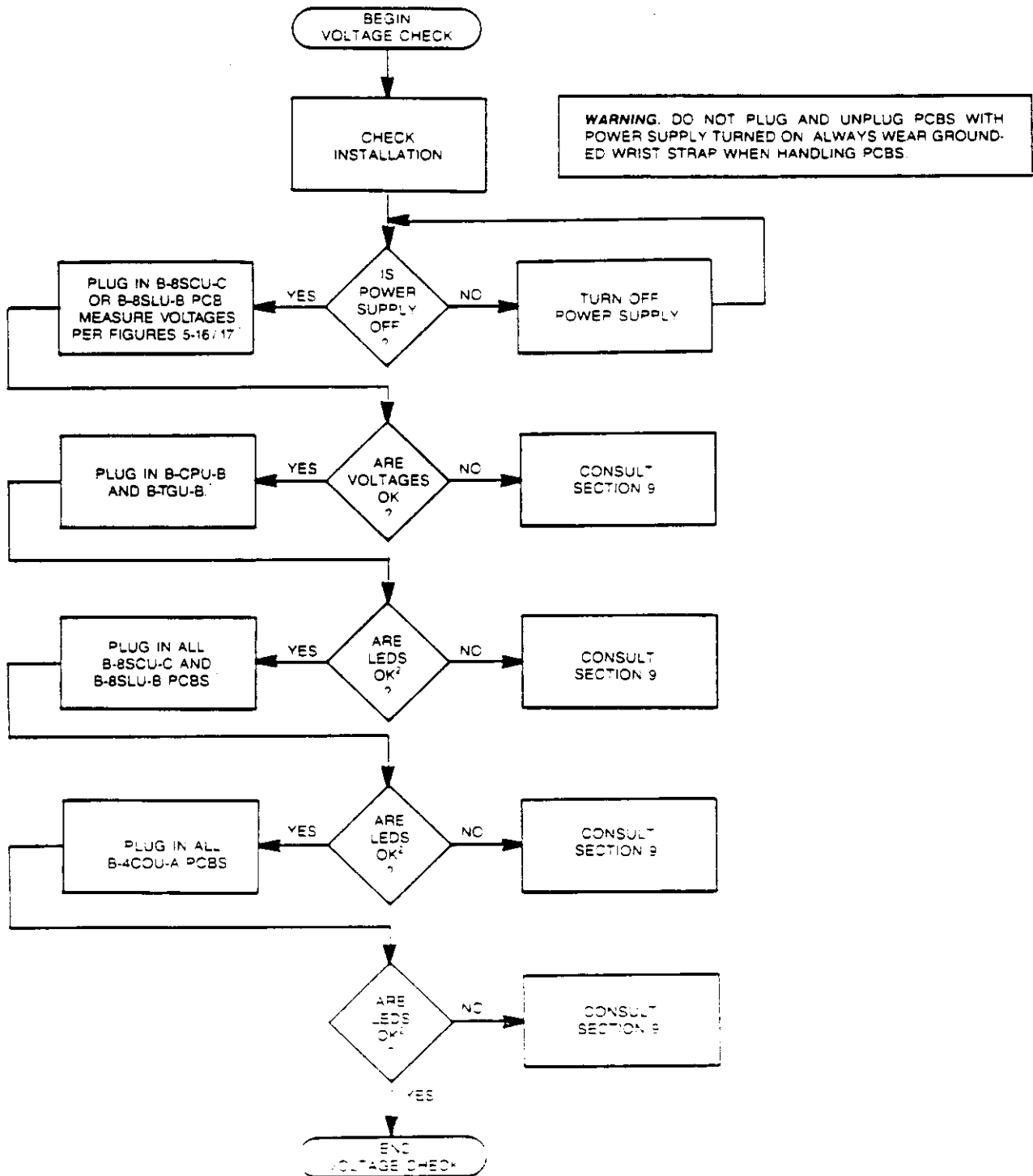
5. SYSTEM VOLTAGE CHECK

5.01 System voltage levels can be tested and/or verified at test points and LEDs (Tables 5-5 and 5-6). This procedure should be completed prior to connecting to the telco lines (or programming) to insure the system is functioning properly. If the LEDs do not respond as indicated (or the voltage measurements are incorrect), refer to Section 9, MAINTENANCE for instructions on how to solve the problem.

To verify system voltage levels:

- Turn on KSU power supply.
- Verify voltages per Figures 5-14 through 5-18.

Table 5-5 VOLTAGE CHECK FLOWCHART, EK-824/1232/1648



Turn power supply off before inserting PCB
 Turn power supply on after inserting PCB
 Verify LEDs per Table 5-6

11035-6-06-4

Table 5-6 SWITCHES AND LEDs, EK-824/1232/1648

ITEM ¹	DESCRIPTION	NORMAL CONDITION
B-CPU-B		
S1	Reset Switch	OFF
S2	Baud Rate Switch	See Figure 5-10
S3	Data Format Switch	See Figure 5-10
DS1	Z80 Processor LED	Fast Flash (RED)
DS2	6502 Processor LED	Slow Flash (RED)
DS3	+ 5V ±12V LED	ON (RED)
B-TGU-B		
DS1	+ 5V LED	ON (GREEN)
DS2	+15V LED	ON (GREEN)
DS3	+12V LED	ON (GREEN)
DS4	+ 5V LED	ON (GREEN)
B-8SCU-C		
DS1	Station Circuit #1 Status LED	ON (RED) when station is functioning and is on hook
DS2	Station Circuit #2 Status LED	Flashes slowly when station is off hook. OFF when station is inoperable or not plugged in
DS3	Station Circuit #3 Status LED	
DS4	Station Circuit #4 Status LED	
DS5	Station Circuit #5 Status LED	
DS6	Station Circuit #6 Status LED	
DS7	Station Circuit #7 Status LED	
DS8	Station Circuit #8 Status LED	
DS9	± 5V, +15V LED	ON (GREEN)
B-8SLU-B		
DS1	Station Circuit #1 Status LED	ON (RED) when station is functioning and is on hook
DS2	Station Circuit #2 Status LED	Flashes slowly when station is off hook. OFF when station is inoperable or not plugged in
DS3	Station Circuit #3 Status LED	
DS4	Station Circuit #4 Status LED	
DS5	Station Circuit #5 Status LED	
DS6	Station Circuit #6 Status LED	
DS7	Station Circuit #7 Status LED	
DS8	Station Circuit #8 Status LED	
DS9	± 5V, +15V LED	ON (GREEN)
B-4COU-A		
DS1	+15V, -12V LED	ON (GREEN)
DS2	+ 5V LED	ON (GREEN)
DS101	Line Circuit #1 Status LED	ON (RED) when seized
DS201	Line Circuit #2 Status LED	ON (RED) when seized
DS301	Line Circuit #3 Status LED	ON (RED) when seized
DS401	Line Circuit #4 Status LED	ON (RED) when seized

¹ Refer to figures 5-14 through 5-18 for device location.

6. CONNECTING TELCO LINES

6.01 The RJ21X connector from the telco will provide service for the CO lines (Table 5-7). The RJ21X connector is joined to the system by using a 25 pair cable terminated with a type 57 connector, female on one end and male on the other. This cable cannot exceed 25 feet in length. Connect as follows:

- Plug the male end of the 25-pair cable into the RJ21X connector from telco (Figure 5-1).
- Plug the female end of the 25-pair cable into the P1 connector on the KSU (Figures 5-1 and 5-3).

Table 5-7 TELCO RJ21X CONNECTOR/CO LINE REFERENCES, EK-824/1232/1648

TELCO RJ21X CONNECTOR		
CO LINE	FUNCTION	PIN
1	TIP	26
	RING	1
2	TIP	27
	RING	2
3	TIP	28
	RING	3
4	TIP	29
	RING	4
5	TIP	30
	RING	5
6	TIP	31
	RING	6
7	TIP	32
	RING	7
8	TIP	33
	RING	8
9	TIP	34
	RING	9
10	TIP	35
	RING	10
11	TIP	36
	RING	11
12	TIP	37
	RING	12
13	TIP	38
	RING	13
14	TIP	39
	RING	14
15	TIP	40
	RING	15
16	TIP	41
	RING	16



7. RADIO FREQUENCY INTERFERENCE

- 7.01 The equipment generates and is susceptible to radio frequency energy. If the system is not installed and used according to the manufacturer's instructions, this equipment may interfere with radio and television reception. It has been type-tested and found to comply with the limits for a Class A computing device, according to the specifications in FCC Rules covering protection against such interference in a commercial installation. However, there is no guarantee that interference will not occur in a particular installation. Interference caused by this equipment to radio or television reception can be determined by turning the equipment off and on. If an interference problem exists, the problem may be solved in one or more of the following ways:
- Reorient the receiving antenna.
 - Relocate the receiver with respect to the equipment.
 - Plug the equipment and receiver into different outlets so that both are on different branch circuits.

- 7.02 If necessary, consult your dealer for additional assistance. The following booklet, prepared by the FCC, may be helpful:

How to Identify and Remove Radio-TV Interference Problems

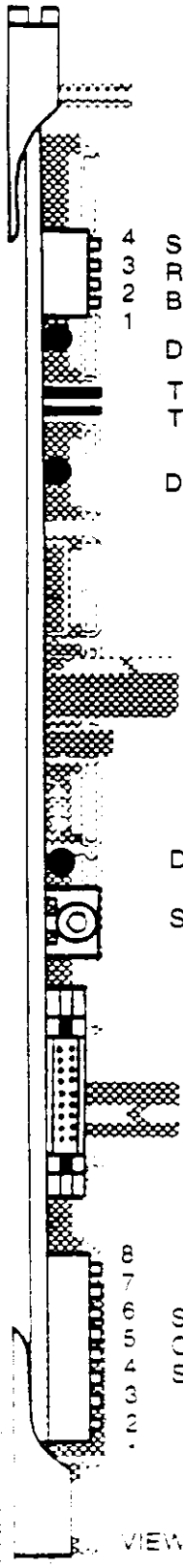
Order this booklet from:

**U.S. Government Printing Office
Washington, D.C. 20402
(Stock No. 004-000-00345-4)**

8. RADIO FREQUENCY SUSCEPTIBILITY

- 8.01 If the system is installed in a strong radio frequency (RF) field, proper system operation may be affected. The use of the proper installation and grounding procedures outlined in this manual will help to minimize the RF susceptibility.

CENTRAL PROCESSING UNIT (B-CPU-B) PCB



4 Switch S2
3 RS232C Port
2 Baud Rate Selection
1

DS3 +5V, +12V & -12V power. Normally on (RED).

TP2 GND
TP1 +5 V DC

DS2 6502 Processor running. Normally flashing slowly (RED).

DS1 Clock (Z80 Processor Running). Normally flashing fast (RED).

S1 Reset Switch

6
7
6 Switch S3
5 Output Data Format
4 Selection
3
2

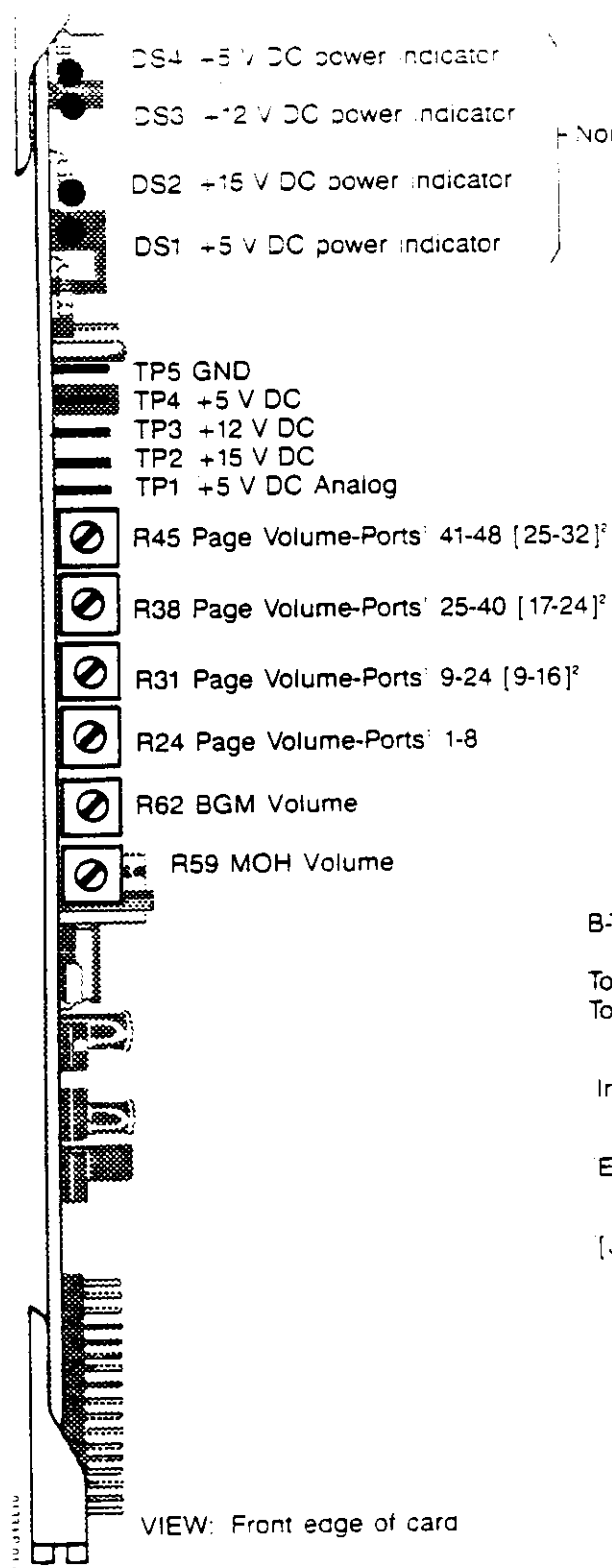
NOTE: ALL VOLTAGES $\pm 5\%$

CAUTION: Turn off power before inserting or removing B-CPU-B PCB

VIEW: Front edge of card

Figure 5-14 CENTRAL PROCESSING UNIT (B-CPU-B) PCB, EK-824 1232 1648

TONE GENERATOR (B-TGU-B) PCB



Normally ON - GREEN

NOTE: ALL VOLTAGES ±5%

B-TGU-B PCB STRAPPING

Tone Gen. #1 strap E1 to E2 (J13) [J8]
 Tone Gen. #2 strap E1 to E3 (J14) [J9]²

Initialized ports.

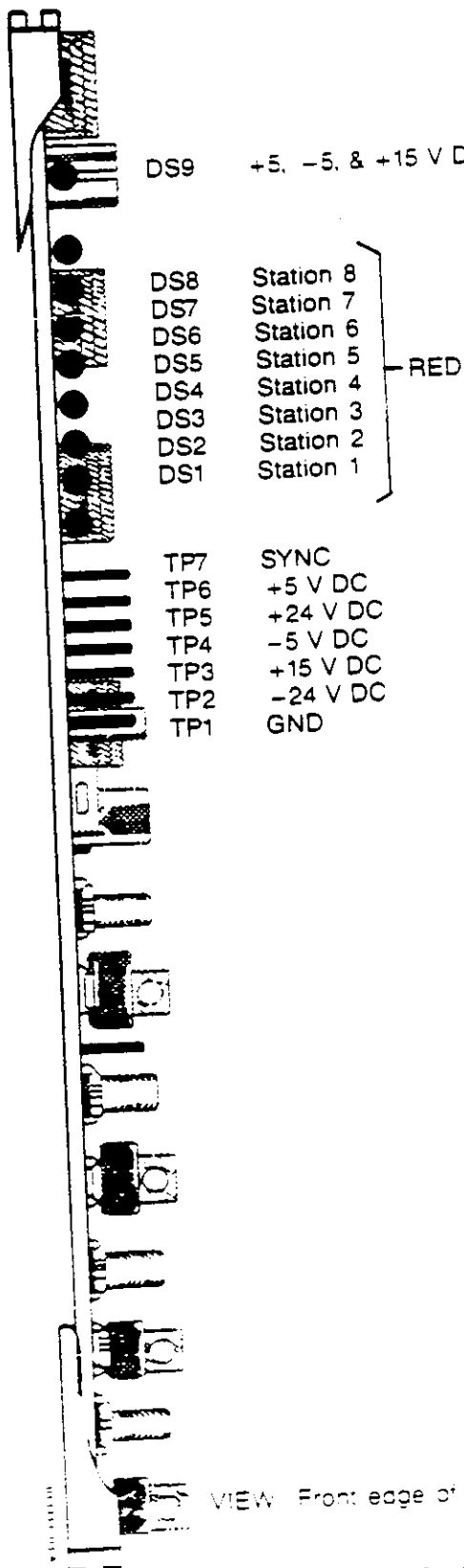
EK-824 KSU does not provide ports 25-32.

[J9] is not used in the EK-824 KSU.

VIEW: Front edge of card

Figure 5-15 TONE GENERATOR UNIT (B-TGU-B) PCB, EK-824/1232/1648

STATION (B-8SCU-C) PCB



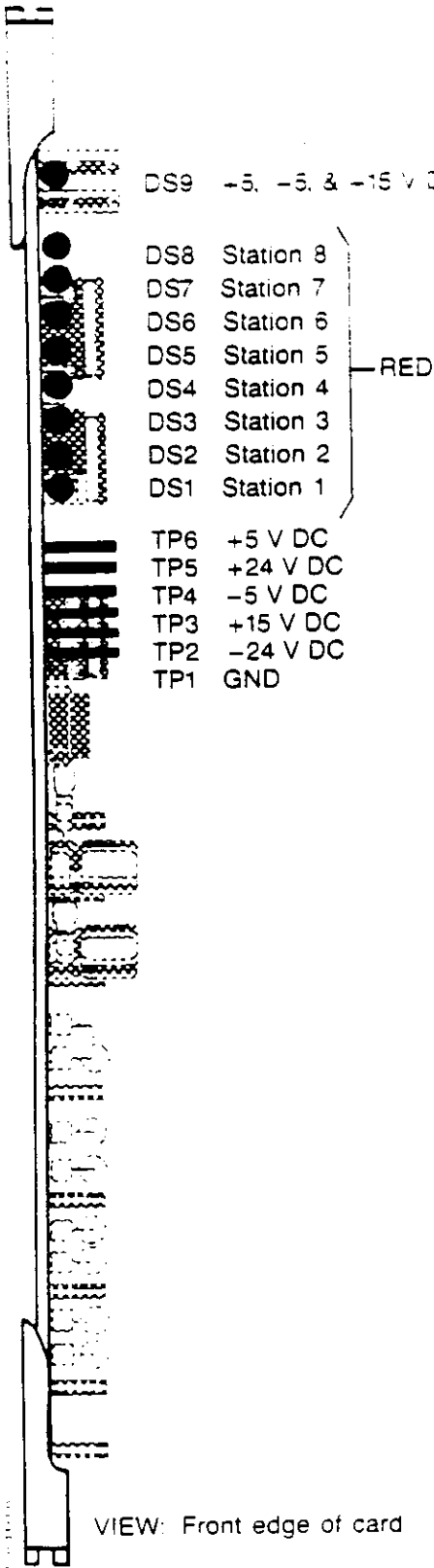
IF LED IS	STATION STATUS IS
OFF	- No telephone is connected
ON STEADY	- Telephone is connected and idle
FLASHING	- Station is busy

NOTE: ALL VOLTAGES $\pm 5\%$

VIEW: Front edge of card

Figure 5-16 STATION (B-8SCU-C) PCB, EK-824/1232/1648

SINGLE LINE (B-8SLU-B) PCB



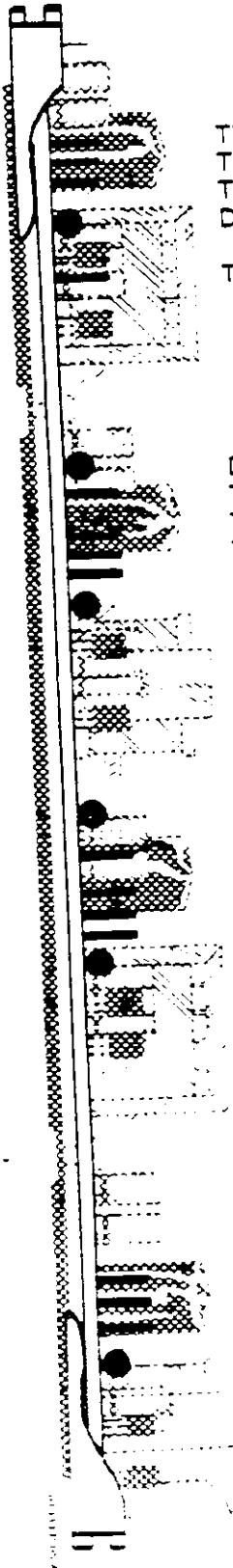
IF LED IS	STATION STATUS IS
OFF	- No telephone is connected.
ON STEADY	- Telephone is connected and idle.
FLASHING	- Station is busy.

NOTE: ALL VOLTAGES $\pm 5\%$

Strap circuit E1 to E2 for single (2500 type) telephone.
 Strap circuit E2 to E3 for one button and OPX telephones.

Figure 5-17 SINGLE LINE (B-8SLU-B) PCB, EK-824/1232/1648

CO LINE (B-4COU-A) PCB



TP403 XPT Analog
 TP402 Tip
 TP401 Ring
 DS401 Status (RED)

Line
 Ckt.
 #4

TP3 -12 V DC

DS1 +15 & -12 V DC (GREEN)
 TP2 +15 V DC
 TP303 XPT Analog
 TP302 Tip
 TP301 Ring
 DS301 Status (RED)

Line
 Ckt.
 #3

DS2 +5 V DC (GREEN)
 TP1 GND
 TP203 XPT Analog
 TP202 Ring
 TP201 Ring
 DS201 Status (RED)

Line
 Ckt.
 #2

TP103 XPT Analog
 TP102 Tip
 TP101 Ring
 DS101 Status (RED)

Line
 Ckt.
 #1

NORMAL LED STATUS
DS1 and DS2 - ON
DS101 - 401: OFF - Line is idle ON - Line is busy or busied out by program

NOTE ALL VOLTAGES ±5%

VIEW: Front edge of card

Figure 5-16 CO LINE (B-4COU-A) PCB, EK-824 1232/1648

EK-824/1232/1648
ELECTRONIC KEY TELEPHONE SYSTEM
SECTION 6, INSTALLATION OF OPTIONAL EQUIPMENT

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LOUD RING EQUIPMENT INSTALLATION	6-5
BACKGROUND MUSIC & MUSIC ON HOLD EQUIPMENT INSTALLATION	6-6
4. OPTIONAL EQUIPMENT	6-6

1. INTRODUCTION

1.01 The INSTALLATION OF OPTIONAL EQUIPMENT Section provides information on the equipment, accessories and customer-supplied equipment that may be used with the system.

NOTE: Throughout this section, references within square brackets [] are applicable to the EK-824 and EK-1232 KSUs. References outside of the brackets are for the EK-1648 KSU. For example, J23 [J16] indicates that J23 is in the EK-1648 KSU and J16 is in the EK-824/1232 KSU.

2. EQUIPMENT ACCESSORIES

2.01 The following is a list of equipment accessories available:

- Directory Tray
- Long cords for handset
- Wall-mounting kits

3. CUSTOMER-PROVIDED EQUIPMENT

3.01 In configuring a system in accordance with Section 3, some optional customer-provided equipment items may be required.

3.02 A call-accounting system, such as the TIE Tele-Record, may be utilized with the system. Verify with the manufacturer that the format is compatible with the format given in Table 6-1.

3.03 Auxiliary amplifiers for external paging should have a 600 ohm input impedance or should have a matching transformer from 600 ohms to the input impedance of the amplifier. Match the speakers for external paging to the amplifier used.

3.04 Loud ringing devices can be connected to the relays in the KSU. These relays, physically located on the B-TGU-B PCB but punched down on the P6 [P4] block, are rated as follows:

Maximum Power: 50 VA/30 WATTS

Maximum Current: 1A

Maximum Voltage: 125 V AC/150 V DC

The loud ringing devices can be bells with self-contained ringing generator supplies, or chimes with self-contained power supplies, etc. If the loud ringing device has requirements that exceed the relay ratings, an external relay must be provided.

For example, a loud ringing device which operates at 1A@95 V DC dissipates 95 watts. Although the current and voltage requirements are individually acceptable, the total power dissipation (watts) is not. This device requires an external relay, which in turn is switched by the relay in the KSU.

Acceptable: 1 AMP \times 24 V DC = 24 WATTS

Unacceptable: 1 AMP \times 90 V DC = 90 WATTS

3.05 Any music source with an output of 600-2000 ohms and an adjustable volume control may be used for Music On Hold (MOH) and/or Background Music (BGM). The music source can be an AM/FM radio, cassette tape deck, automatic turntable, etc. The source plugs into the Key Service Unit (KSU) backplane with standard phono jacks. If the output impedance of the music source is 8 ohms, a matching transformer may be required.

SMDR PRINTER INSTALLATION

3.06 The SMDR printer is connected to the KSU backplane with an RS-232-C Interface Connector (Figure 6-1). The baud rate (S2) switch (Figure 6-2) on the B-CPU-B PCB must be set to match the rate of the programming terminal.

3.07 Call records are transmitted to the printer as they are completed. The output format is shown in Table 6-1, and a sample printout is shown in Table 6-2. The heading repeats after every 21 lines of call data.

3.08 The system clock on the B-CPU-B PCB will allow SMDR to record time and date. However, in the event of a power failure, the clock must be reset. SMDR requires an optional Battery Backed-Up Real Time Clock Daughter Board to be added to the Tone Generator PCB if exact battery backed-up time is required.

EXTERNAL PAGING EQUIPMENT INSTALLATION

3.09 Customers whose facilities include large exterior or interior spaces with high noise levels may require external paging equipment. This equipment consists of heavy-duty speakers driven by auxiliary amplifiers.

3.10 The KSU is equipped with relays that can be programmed to close or to open during paging. If desired, the relays can be programmed not to respond to paging.

3.11 When the paging circuit is idle, power is not supplied to the amplifier. Power is supplied to the amplifier only when the relays change state (i.e., when paging is activated). The external paging equipment must be compatible with the ratings of the relays (refer to paragraph 3.04).

Table 6-1 FORMAT OF SMDR PRINTOUT, EK-824/1232/1648

FORMAT OF HEADER:

```

CR LF LF LF LF LF
TYP ST LN DATE START DURATION TIME RINGING PHONE NUMBER ACCOUNT CR LF LF

```

FORMAT OF EACH OUTGOING CALL LINE:

```

XXX SP XX SP XX SP XX/XX/XX SP XX:XX:XX SP XX:XX:XX SP XXXXXXXXXXXXXXXXXXXXXXXXXXX SP XXXXXXXX CR LF LF

```

FORMAT OF EACH INCOMING CALL LINE:

```

XXX SP XX SP XX SP XX/XX/XX SP XX:XX:XX SP XX:XX:XX SP XX:XX:XX SP XXXXXXXX CR LF LF

```

EXAMPLE:

```

(CR LF) (LF LF LF LF LF)
TYP ST LN DATE START DURATION TIME RINGING PHONE NUMBER ACCOUNT
(CR LF) (LF)
OUTGOING XXX-XX-XX-XX/XX-XX-XX-XX-XX-XX-XX-XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX-XXXXXXXXXX
INCOMING XXX-XX-XX-XX/XX-XX-XX-XX-XX-XX-XX-XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX-XXXXXXXXXX
SCALE 1 10 20 30 40 50 60 70 80

```

TYPES OF CALLS

- OTG OUTGOING CALL
- BLK OUTGOING CALL BLOCKED BY TOLL RESTRICTION
- INC INCOMING CALL ANSWERED
- RNA INCOMING CALL NOT ANSWERED

KEY TO SYNTAX ELEMENTS:

ELEMENT	MEANING	ASCII CODE
CR	CARRIAGE RETURN	ODM
LF	LINE FEED	OAH
X	DATA CHARACTER	ALPHANUMERIC

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Table 6-2 TYPICAL SMDR PRINTER OUTPUT, EK-824/1232/1648

TYP	ST	LN	DATE	START	DURATION	TIME RINGING	PHONE NUMBER	ACCOUNT
OTG	04	01	02/18/84	00:47:08	00:01:51		18006653324	
ITG	04	01	02/18/84	00:49:11	00:00:51		12039297373	
ITG	04	01	02/18/84	00:50:10	00:02:13		9293305	
ITG	04	04	02/18/84	00:52:24	00:00:10		1422885	
ITG	04	01	02/18/84	00:52:55	00:00:37		14135556690	
ITG	04	03	02/18/84	00:53:45	00:00:24		9295563	88853
ITG	04	03	02/18/84	00:54:20	00:00:37		14068857474	99654

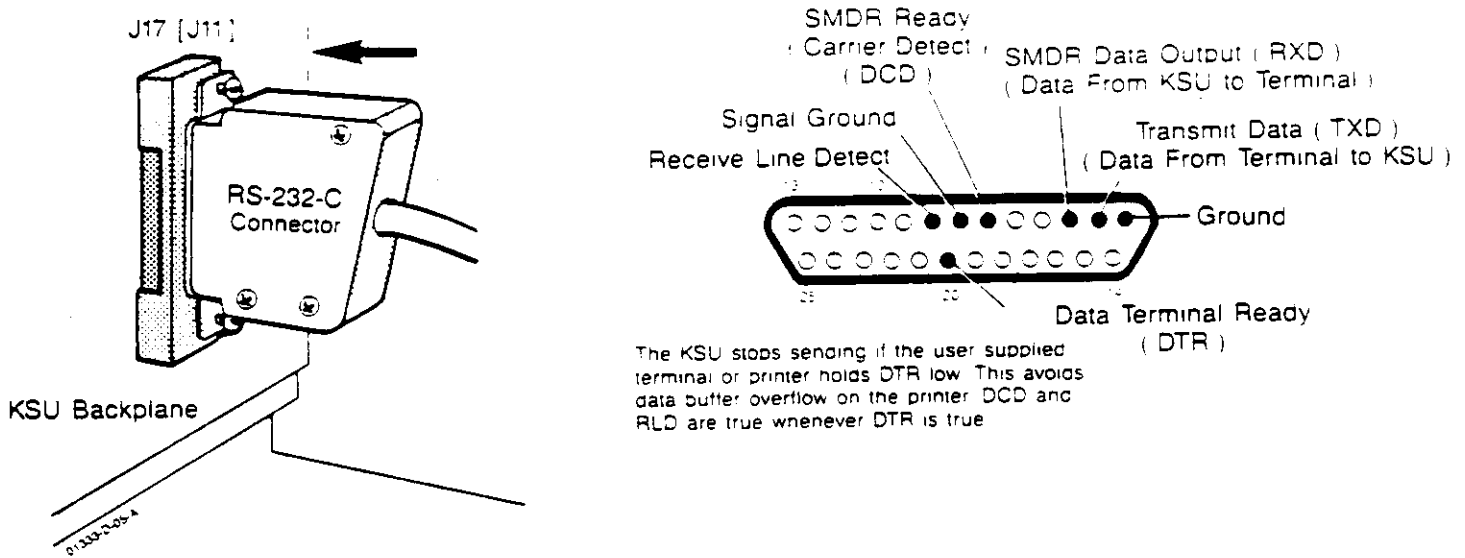


Figure 6-1 RS-232-C INTERFACE CONNECTOR AND PIN ASSIGNMENT, EK-824/1232/1648

SWITCH S2				
Baud Rate	Selector			
	1	2	3	4
50	C	O	C	C
75	O	O	C	C
110	O	O	O	C
135	C	C	O	C
150	C	O	O	C
200	O	C	O	C
300	O	C	O	C
600	O	C	O	C
1200	O	C	O	C
1800	O	C	O	C
2400	O	C	O	C
4800	O	C	O	C
9600	C	C	O	O

Note: O equals the OPEN position on the selectors. C equals the closed position.

SERIAL DATA SWITCH (S3) SELECTOR								
1	2	3	4	5	6	7	8	
							O	Parity Enable
							C	Parity Disable
							O	Parity Even
							C	Parity Odd
								Not Used
						O	O	1 Stop Bit
						O	O	1.5 Stop Bits
						O	O	2 Stop Bits
								Not Used
								7 Bits Per Char
								8 Bits Per Char
								Not Used

Bit Number: C = Open X = Don't Care
 O = Closed

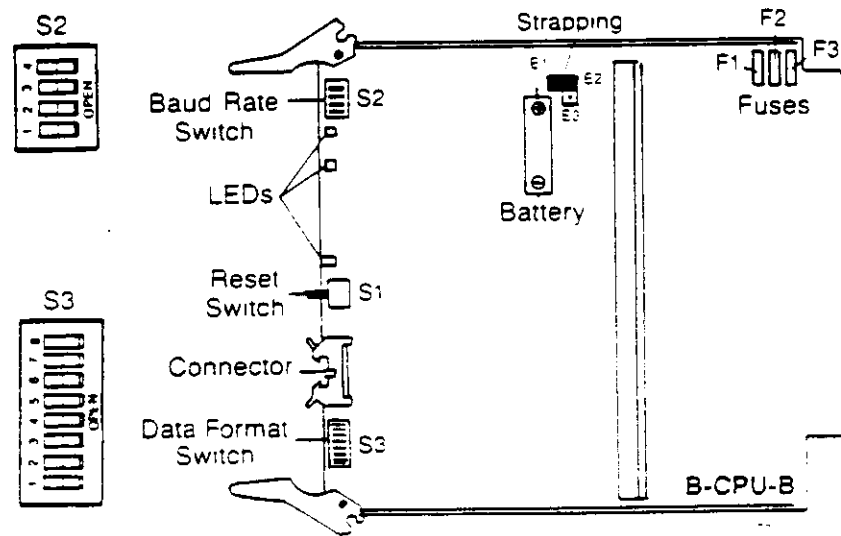


Figure 6-2 BAUD RATE AND SERIAL DATA SWITCH ON B-CPU-B, EK-824/1232/1648

3.12 Refer to Figure 6-3 and install the external paging components as follows (EK-1648 KSU shown):

- a) Verify that the appropriate leads in the 25-pair cable from the P6 [P4] connector on the backplane are connected to the P6 [P4] block. Refer to Table 5-2.
- b) Connect amplifiers to the 66M1-50 connecting block using the black and yellow wires for the station ports programmed as Alternate Audio Ports (EXT in the S: ST OPTS field).
- c) Install bridging clips to establish continuity between both sides of the block.
- d) Refer to the SOFTWARE CONFIGURATION Section of this manual (Section 4). Enter the appropriate code to allow the relay contacts to close when the paging circuit is idle and to open when it is active.

Installation Procedure

3.17 Refer to Figure 6-3 and install the loud ringing circuit for relay #2 as follows (EK-1648 KSU shown):

- a) Verify that the appropriate leads in the 25-pair cable from the P6 [P4] connector on the backplane are connected to the P6 [P4] block. Terminate the WHT-BLU lead on clip 1 and the BLU-WHT lead on clip 2.
- b) Connect the leads from the power supply and relay to the block. Terminate these leads on clip 1 and clip 2, respectively.
- c) Install bridging clips for rows 1 and 2.
- d) Install bell, buzzer or loudspeaker horn equipment.
- e) Refer to the SOFTWARE CONFIGURATION Section of this manual and enter the appropriate codes to cause the contacts to close.

LOUD RING EQUIPMENT INSTALLATION

3.13 A loud ring relay setup allows CO Audible to be given by the sounding of external bells, buzzers, or loudspeaker horns, while the system is in the night ring mode. These devices are usually used in noisy areas and/or large spaces to call attention to incoming CO calls.

3.14 A power supply (producing a maximum of 30 V DC at 1 ampere) and a relay are recommended for the contact circuit. In addition, a signaling device activated by the contact circuit is required. This device can be a bell with ringing generator supply, buzzer with power supply, or loudspeaker horn.

3.15 The relay is energized when a CO call comes in. This causes the contacts to close, activating bells, buzzers or loud-speaker horns.

3.16 As explained in the SOFTWARE CONFIGURATION Section of this manual, the continuous or interrupted operation of the relay can be altered through programming. The relay can be programmed to operate in the night mode, and can be controlled by either tenant in a two tenant system.

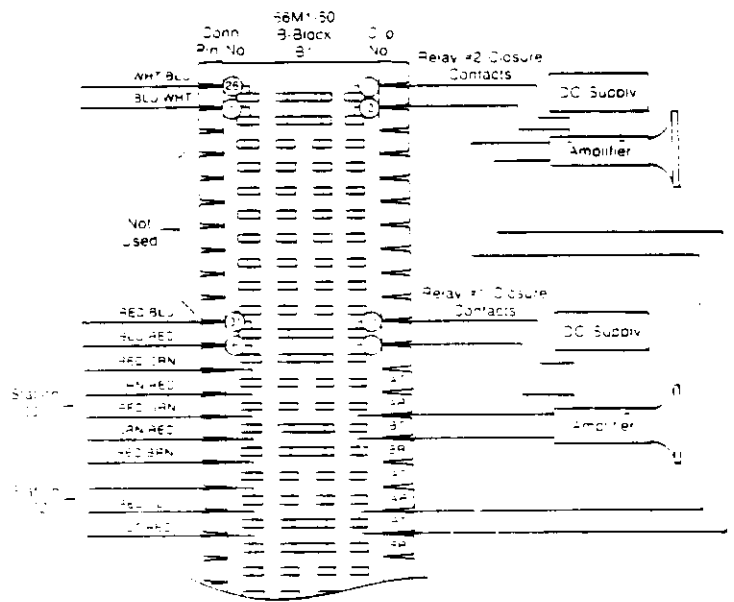


Figure 6-3 TYPICAL OPTIONAL CONNECTIONS USING ALTERNATE AUDIO PORTS, EK-824/1232/1648

BACKGROUND MUSIC AND MUSIC ON HOLD EQUIPMENT INSTALLATION

3.18 As illustrated in Figure 6-4, the backplane is equipped with standard phono jacks (J22 [J15] and J23 [J16]) and strapping pins (E1, E2, and E3). J23 [J16] is used to connect a music source to provide MOH. J22 [J15] is for BGM.

BGM Jacks and Pin Strapping

3.19 Directions for installing a music source are presented below:

- Connect the output from the music source to the BGM and/or MOH jack (J22 [J15] and/or J23 [J16]).
- Check that the strapping bar is connected properly. If BGM and MOH are from the same source, strap E1 to E2. If different sources are to be used for BGM and MOH, strap E2 to E3.

- Listen to the volume level of the MOH and the BGM, then adjust them to the desired levels.

4. OPTIONAL EQUIPMENT

4.01 The following publications on optional equipment are available:

	Document Number
SPECIAL LOUD RINGING TONE BOARD (P/N 86185)	01042
B-RTC-A REAL TIME CLOCK DAUGHTER BOARD (P/N 86028)	01010
TIE ELECTRONIC RINGER (P/N 86187)	01084
TELE-RECORD (P/N 19500)	01026

Installation instructions for Off Premises Extensions are included at the end of this manual as Appendix F.

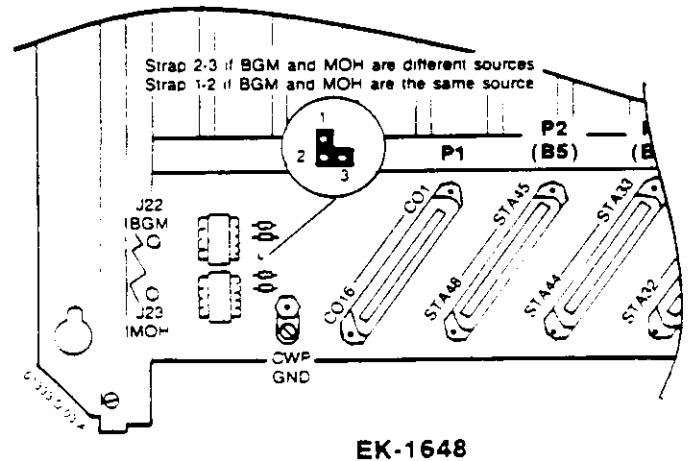
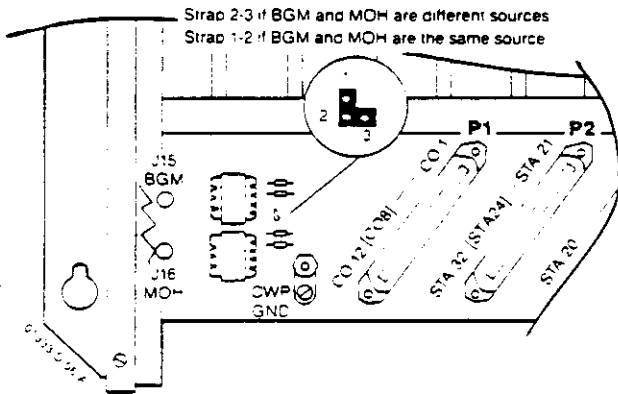


Figure 6-4 LOWER LEFT PORTION OF KSU BACKPLANE SHOWING MOH JACKS, BGM JACKS AND PIN STRAPPING. EK-824/1232/1648

EK-824/1232/1648
ELECTRONIC KEY TELEPHONE SYSTEM
SECTION 7, PROGRAM ENTRY

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NOTE: Throughout this section, references within square brackets [] are applicable to the EK-824/1232 KSUs. References outside of the brackets are for the EK-1648 KSU. For example, J17 [J11] indicates that J17 is in the EK-1648 KSU and J11 is in the EK-824/1232 KSU.

1. INTRODUCTION

1.01 The PROGRAM ENTRY Section describes the procedures for programming the system. During programming, the data recorded on the Program Record Forms (PRFs) in Section 4, SOFTWARE CONFIGURATION, is entered into system memory. This section is divided into three parts: PREPARATION, SYSTEM INITIALIZATION and PROGRAM ENTRY.

2. PREPARATION

2.01 The following paragraphs outline the procedures that are required to prepare the system for programming.

- (1) Programming information must be recorded on the PRFs before programming the system.
- (2) Plug any ASCII terminal or printer having an RS-232-C interface into the J17 [J11] connector (Figure 7-1) on the KSU backplane.
- (3) The baud rate switch (S2) and the serial data switch (S3) on the B-CPU-B Printed Circuit Board (PCB) must be set to match the programming terminal (Figure 7-2).

3. SYSTEM INITIALIZATION

3.01 The system must be initialized, before options are programmed, to set all fields to default entries. Initialization erases all previously selected options.

CAUTION: INITIALIZATION RETURNS ALL FIELDS TO DEFAULT ENTRIES. ALL PREVIOUS PROGRAMMING IS ERASED.

To begin programming the system:

(1) Press *M* key. The following message appears:

16/48 V3.0 10 AUG 1984
H FOR HELP

The $\>$ character will appear to indicate that the system is in the programming mode. In this mode the system will respond to any commands on the menu and the Station Message Detail Recording (SMDR) print function will be disabled.

(2) Press *H* key. The following menu appears:

I: INITIALIZE
D: DATE
O: OPRS
K: TENANTS
C: TMRS
F: FLGS
G: GRPS
L: CO OPTS
E: EXT PG (Not Used)
R: EXT RLY
T: TOLL RES
P: PORTS
S: ST OPTS
H: HELP
Z: DONE
CTL-E: ERR
ESC. CTL-Q: QUIT

CAUTION: INITIALIZATION RETURNS ALL FIELDS TO DEFAULT ENTRIES. ALL PREVIOUSLY ENTERED PROGRAMMING IS ERASED.

(3) Press *I* key to start the Initialization program. The following message appears:
YOU SURE? (Y/N)..

(4) Press *Y* for YES and press RETURN key, or press *N* for NO (and RETURN) to escape. When Initialization is complete, the following message appears:

.....
.....

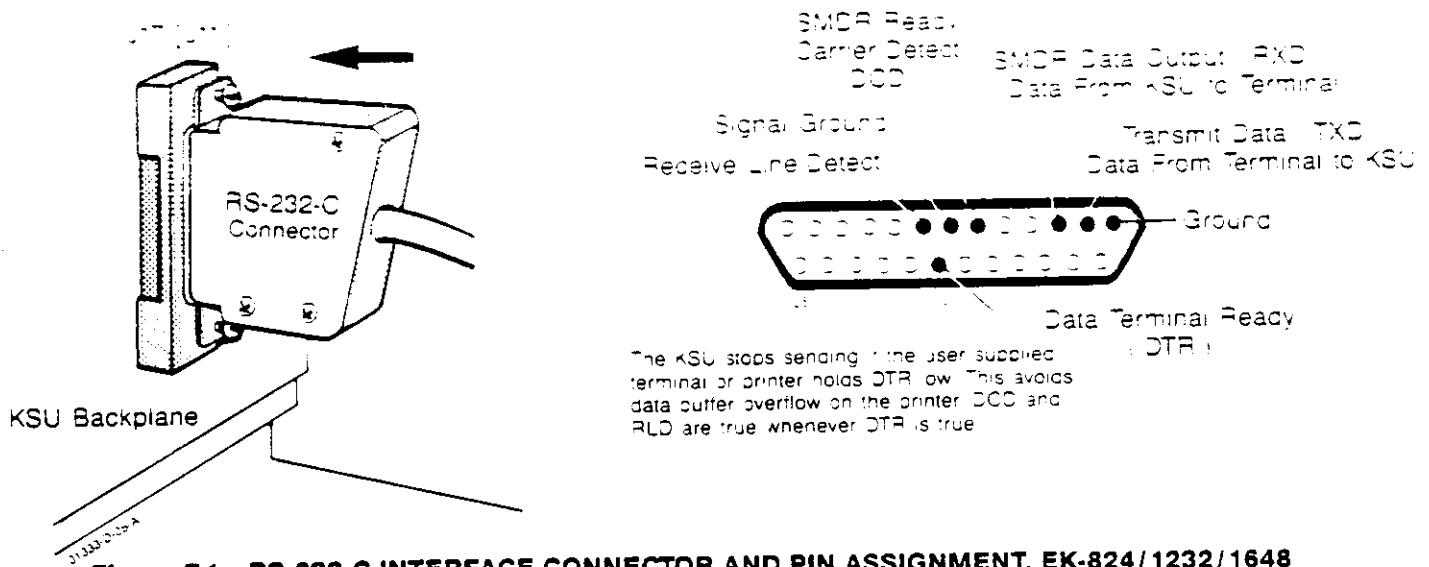


Figure 7-1 RS-232-C INTERFACE CONNECTOR AND PIN ASSIGNMENT, EK-824/1232/1648

SWITCH S2				
Baud Rate	Selector			
	1	2	3	4
50	C	O	C	C
75	O	O	C	C
110	O	O	O	C
135	C	C	O	C
150	C	O	O	O
200	O	C	O	C
300	O	C	O	O
600	C	O	O	C
1200	O	O	C	O
1800	C	O	C	O
2400	O	C	O	O
4800	O	C	C	O
9600	C	C	C	O

Note: O equals the OPEN position on the selectors. C equals the closed position.

SERIAL DATA SWITCH (S3) SELECTOR							
1	2	3	4	5	6	7	8
						O	Parity Enable
						C	Parity Disable
						O	Parity Even
						C	Parity Odd
				O	O		Not Used
				O	C		1 Stop Bit
				C	O		15 Stop Bits
				C	C		2 Stop Bits
				X			Not Used
				C			7 Bits Per Char
				O			8 Bits Per Char
				X	X		Not Used

Bit Number O = Open x = Don't Care
C = Closed

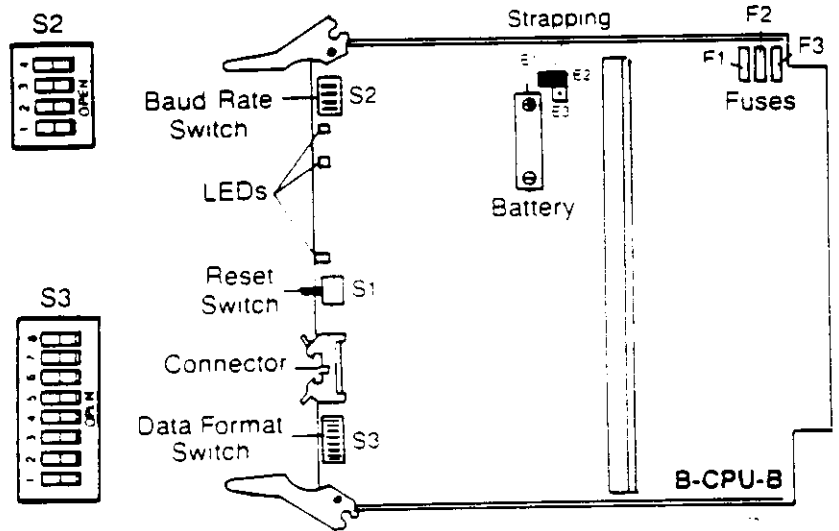


Figure 7-2 SERIAL DATA SWITCH (S3), BAUD RATE SWITCH (S2) AND RESET SWITCH (S1) LOCATIONS, EK-824/1232/1648

4. PROGRAM ENTRY

4.01 All of the fields contain default entries from the initialization program. To leave an existing entry, press the RETURN key until the cursor reaches the desired field. Make a change by keying in the required data and pressing the RETURN key.

4.02 To correct an input error, press CTRL key and E key simultaneously to repeat the last entry line and correct the entry. To exit a field or sub-field, press the Z key.

PROGRAM D: DATE

4.03 Press the D key to enter the Date. The attendant can also program the Date from the attendant's console in the event of a power failure. The following fields appear one at a time as the RETURN key is pressed:

MT__ (Enter 01 for January, 12 for December)
DAY OF MT__ (01-31)
YR LSD__ (Enter 84 for 1984)
HR__ (Military time, 00-23)
MIN__ (Enter 00-59)
SEC__ (Enter 00-59)
DAY OF WK__ (Enter 01 for Sunday, 07 for Saturday)
YR MSD__ (Enter 19 for 1984)

PROGRAM O: OPERATORS

4.04 Press the O key to enter Operator data. For each prompt:

- (1) Enter data from Table 4-2.
- (2) Press the RETURN key.

The prompts and default values for Operators are:

OP 1 1__
2 PRT DSS (DS1) OP 1 NONE__
2 PRT DSS (DS2) OP 1 NONE__
1 PRT DSS (DS3) OP 1 NONE__
ALT OP 1 NONE__

OP 2 NONE__
2 PRT DSS (DS1) OP 2 NONE__
2 PRT DSS (DS2) OP 2 NONE__
1 PRT DSS (DS3) OP 2 NONE__
ALT OP 2 NONE__

PROGRAM K: TENANTS

4.05 Press the K key to enter Tenant data. For each prompt:

- (1) Enter data from Table 4-2.
- (2) Press the RETURN key.

The prompts and default values for Tenants are:

TNNT 1 LAST CO 16__
TNNT 1 LAST ST 48__
TNNT 1 LAST BIN 80__

PROGRAM C: TIMERS

4.06 Press the C key to enter Timer data. For each prompt:

- (1) Enter data from Table 4-2.
- (2) Press the RETURN key.

The prompts and default values for Timers are:

HLD RCL ST 60__
HLD RCL OP 60__
FLSH 100 MS 10__
PAUSE 6__
XFER 30__
DIAL TONE 2__
SMDR OTG 30__
SMDR INC 6__
CO CALL WTC 30__
REG FRST DIG 15__
REG SBSQ. DIG 6__
MIN RNG BRST 100MS 4__
MAX RNG IDLE 100MS 60__
MIN DRP PLSE 100MS 6__
BRK MS 61__
MAKE MS 39__
INTRDG # PER 10__
DTMF SPD DIAL 10MS 6__
DTMF MAN DIAL 10MS 12__
PRV TONE 10__
ALT OP XFER 30__

PROGRAM F: FLAGS

- 4.07 Press the F key to enter Flag data. For each prompt:
- (1) Enter data from Table 4-2.
 - (2) Press the RETURN key.

The prompts and default values for Flags are:

- MUS ON HLD NO__
- OP 1 BRG IN NO__
- OP 2 BRG IN NO__
- DYLT SVES ADJ YES__
- SLI CO/INT RNG NO__
- CO DRP ENA NO__
- CO CALL WT YES__
- OP 1 INT CALL WT YES__
- OP 2 INT CALL WT YES__
- CO SEARCH YES__
- RNG INT CALLS NO__
- SMDR INC YES__
- SMDR RNA YES__
- SMDR PBX YES__
- SMDR LOC YES__
- SMDR L.D. YES__
- SMDR BLCKED YES__
- PG RCV BEEP YES__
- PRV TONES NO__
- TCX-128 KSU NO__
- MIC OFF IF DIALING YES__

CAUTION: DYLT SVES ADJ PROMPT APPEARS ONLY WHEN A REAL TIME CLOCK PCB IS INSTALLED. THIS PROMPT IS CURRENTLY NOT USED. DO NOT ATTEMPT TO CHANGE THE DEFAULT VALUE.

PROGRAM G: LINE GROUPS

- 4.08 Press the G key to enter Line Groups. For each prompt:
- (1) Enter data from Table 4-2.
 - (2) Press the RETURN key.

The prompts and default values for Line Groups are:

- DIAL 9 GRP 1__
- MEM DIAL GRP 1__

PROGRAM L: LINE OPTIONS

- 4.09 Press the L key to enter Line Options. The system prompts:

ENT CO

- (1) Enter number of line to be programmed.
- (2) Press the RETURN key. For each prompt:
Enter data from Table 4-2.
Press the RETURN key.

The prompts and default values for Line Options are:

- GROUP 1__
- PULSE NO__
- BEHIND PBX NO__
- '1+' DIALING YES__
- BUSY OUT NO__
- UNIV NT ANS NO__
- '10+' DIALING NO__

Prompts and default values appear as above for all 16 lines.

NOTE: Be sure to busy out all lines that are not installed.

PROGRAM E: EXTERNAL PAGE ZONES

NOTE: External Paging is available in the EK-1648 system. External Paging uses External Audio Ports programmed in the S: ST OPTS field, not this program. Refer to Section 6. INSTALLATION OF OPTIONAL EQUIPMENT.

PROGRAM R: EXTERNAL RELAYS

4.10 Press the R key to enter External Relay data. For each prompt:

- (1) Enter data from Table 4-2.
- (2) Press the RETURN key.

The prompts and default values for External Relays are:

RLY 1 NT RNG 8..1 00__
RLY 1 NT RNG 16..9 00__

RLY 2 NT RNG 8..1 00__
RLY 2 NT RNG 16..9 00__

RLY 1 PG 7..0 00__
RLY 2 PG 7..0 00__

| | | | | O/C/C/I |
RLY 1 MISC 00__
RLY 2 MISC 00__

PROGRAM T: TOLL RESTRICTION

4.11 Press the T key to enter Toll Restriction data. The prompt H FOR HELP% appears. Press the H key for the following menu:

D: '1+' NXX: COS
L: NXX: COS
R: RES. NOS.
A: '1+' RES. NOS. COS
B: RES. NOS. COS
X: PBX CODES
Y: PBX COS
O: OCC LOC NOS.
P: OCC EQ. ACCS. NOS.
J: MISC.

1. Type the letter corresponding to the option to be programmed.
2. Press the RETURN key.

NOTE: An X may be entered for any entry that is not changed (i.e., 110X00XX). For example, to change 94111111 to 5-111111, enter 5XXXXXXX.

D: '1+' NXX: COS

Press the D key for the prompt. ENT '1+' NXX.

- (1) Type in the specific area or exchange code to be changed, type in a range of area or exchange codes (i.e., 200-204), type in .NPX to change all area codes, or type in .NXX to change all exchange codes.
- (2) Enter data from Table 4-3 and press the RETURN key.

L: NXX: COS

Press the L key for the prompt. ENT NXX.

- (1) Type in the specific area or exchange code to be changed, type in a range of area or exchange codes (i.e., 200-204), type in .NPX to change all area codes, or type in .NXX to change all exchange codes.
- (2) Enter data from Table 4-4 and press the RETURN key.

R: RES. NOS.

Press the R key. For each prompt:

- (1) Enter data from Table 4-5.
- (2) Press the RETURN key.

The prompts and default values for Restricted Numbers are:

RES. NO. 1 IS NONE__
RES. NO. 2 IS NONE__
RES. NO. 3 IS NONE__
RES. NO. 4 IS NONE__
RES. NO. 5 IS NONE__
RES. NO. 6 IS NONE__
RES. NO. 7 IS NONE__
RES. NO. 8 IS NONE__
RES. NO. 9 IS NONE__
RES. NO. 10 IS NONE__

A: 1- RES. NOS. COS

Press the A key. For each prompt:

- (1) Enter data from Table 4-2.
- (2) Press the RETURN key.

The prompts and default values for Leading 1 Class of Service for Restricted Numbers are:

- 1- RES. NO. 1 COS IS 00000000__
- 1- RES. NO. 2 COS IS 00000000__
- 1+ RES. NO. 3 COS IS 00000000__
- 1+ RES. NO. 4 COS IS 00000000__
- 1+ RES. NO. 5 COS IS 00000000__
- 1+ RES. NO. 6 COS IS 00000000__
- 1+ RES. NO. 7 COS IS 00000000__
- 1+ RES. NO. 8 COS IS 00000000__
- 1+ RES. NO. 9 COS IS 00000000__
- 1+ RES. NO. 10 COS IS 00000000__

B: RES. NOS. COS

Press the B key. For each prompt:

- (1) Enter data from Table 4-2.
- (2) Press the RETURN key.

The prompts and default values for Class of Service for Restricted Numbers are:

- RES. NO. 1 COS IS 11111111__
- RES. NO. 2 COS IS 11111111__
- RES. NO. 3 COS IS 11111111__
- RES. NO. 4 COS IS 11111111__
- RES. NO. 5 COS IS 11111111__
- RES. NO. 6 COS IS 11111111__
- RES. NO. 7 COS IS 11111111__
- RES. NO. 8 COS IS 11111111__
- RES. NO. 9 COS IS 11111111__
- RES. NO. 10 COS IS 11111111__

X: PBX CODES

Press the X key. For each prompt:

- (1) Enter data from Table 4-2.
- (2) Press the RETURN key.

The prompts and default values for PBX Codes are:

- PBX CODE 1 IS NONE__
- PBX CODE 2 IS NONE__
- PBX CODE 3 IS NONE__
- PBX CODE 4 IS NONE__
- PBX CODE 5 IS NONE__
- PBX CODE 6 IS NONE__
- PBX CODE 7 IS NONE__
- PBX CODE 8 IS NONE__
- PBX CODE 9 IS NONE__
- PBX CODE 10 IS NONE__

Y: PBX COS

Press the Y key. For each prompt:

- (1) Enter data from Table 4-2.
- (2) Press the RETURN key.

The prompts and default values for Class of Service for PBX Access Codes are:

- PBX CODE 1 COS IS 00000011__
- PBX CODE 2 COS IS 00000011__
- PBX CODE 3 COS IS 00000011__
- PBX CODE 4 COS IS 00000011__
- PBX CODE 5 COS IS 00000011__
- PBX CODE 6 COS IS 00000011__
- PBX CODE 7 COS IS 00000011__
- PBX CODE 8 COS IS 00000011__
- PBX CODE 9 COS IS 00000011__
- PBX CODE 10 COS IS 00000011__

O: OCC LOC NOS.

Press the O key. For each prompt:

- (1) Enter data from Table 4-2.
- (2) Press the RETURN key.

The prompts and default values for Other Common Carrier Local Numbers are:

- OCC LOC #1 IS NONE__
- OCC LOC #2 IS NONE__
- OCC LOC #3 IS NONE__
- OCC LOC #4 IS NONE__
- OCC LOC #5 IS NONE__
- OCC LOC #6 IS NONE__
- OCC LOC #7 IS NONE__
- OCC LOC #8 IS NONE__
- OCC LOC #9 IS NONE__
- OCC LOC #10 IS NONE__

P: OCC EQ. ACCS. NOS.

Press the P key. For each prompt:

- (1) Enter data from Table 4-2.
- (2) Press the RETURN key.

The prompts and default values for Other Common Carrier Equal Access Numbers are:

- OCC EQ. ACCS. 1 IS NONE__
- OCC EQ. ACCS. 2 IS NONE__
- OCC EQ. ACCS. 3 IS NONE__
- OCC EQ. ACCS. 4 IS NONE__
- OCC EQ. ACCS. 5 IS NONE__
- OCC EQ. ACCS. 6 IS NONE__
- OCC EQ. ACCS. 7 IS NONE__
- OCC EQ. ACCS. 8 IS NONE__
- OCC EQ. ACCS. 9 IS NONE__
- OCC EQ. ACCS. 10 IS NONE__

J: MISC.

Press the J key. For each prompt:

- (1) Enter data from Table 4-2.
- (2) Press the RETURN key.

The prompts and default values for Miscellaneous Restriction are:

- *81 COS 1111111__
- *82 COS 1111111__
- *83 COS 1111111__
- *84 COS 1111111__
- NO. DDD DIGS 11__
- NO. OCC ACC DIGS 6__
- NO. SMDR ACC DIGS 10__
- NO. DIGS LOC CALL 7__

Press the Z key to return to the program command mode.

PROGRAM P: PORTS

4.12 Press the P key to enter port assignments. The ENT PRT # prompt appears.

- 1. Press the RETURN key for the first port in the system. or enter the number of the port to be programmed and press the RETURN key.
- 2. Enter data from Table 4-2.
- 3. Press the RETURN key.

The prompts and default values for Port Number Assignments are:

- PRT 1 IS ST 1__
- PRT 2 IS ST 2__
- PRT 3 IS ST 3__
- PRT 4 IS ST 4__
- PRT 5 IS ST 5__
- PRT 6 IS ST 6__
- PRT 7 IS ST 7__
- PRT 8 IS ST 8__
- PRT 9 IS ST 9__
- PRT 10 IS ST 10__
- PRT 11 IS ST 11__
- PRT 12 IS ST 12__
- PRT 13 IS ST 13__
- PRT 14 IS ST 14__
- PRT 15 IS ST 15__
- PRT 16 IS ST 16__
- PRT 17 IS ST 17__

- PRT 18 IS ST 18__
- PRT 19 IS ST 19__
- PRT 20 IS ST 20__
- PRT 21 IS ST 21__
- PRT 22 IS ST 22__
- PRT 23 IS ST 23__
- PRT 24 IS ST 24__
- PRT 25 IS ST 25__
- PRT 26 IS ST 26__
- PRT 27 IS ST 27__
- PRT 28 IS ST 28__
- PRT 29 IS ST 29__
- PRT 30 IS ST 30__
- PRT 31 IS ST 31__
- PRT 32 IS ST 32__
- PRT 33 IS ST 33__
- PRT 34 IS ST 34__
- PRT 35 IS ST 35__
- PRT 36 IS ST 36__
- PRT 37 IS ST 37__
- PRT 38 IS ST 38__
- PRT 39 IS ST 39__
- PRT 40 IS ST 40__
- PRT 41 IS ST 41__
- PRT 42 IS ST 42__
- PRT 43 IS ST 43__
- PRT 44 IS ST 44__
- PRT 45 IS ST 45__
- PRT 46 IS ST 46__
- PRT 47 IS ST 47__
- PRT 48 IS ST 48__

EZ

PROGRAM 5: STATION OPTIONS

4.13 Press the S key to program station options. The ENT ST # prompt appears.

- (1) Press the RETURN key for the first station in the system, or enter the number of the station to be programmed and press the RETURN key.
- (2) For each prompt:
Enter data from Table 4-5. For the prompts COS LINE # IS, enter data from Table 4-6.
Press the RETURN key.

The prompts and default values for Station Options are (station 301 shown):

ST 1.____
 TYPE KEY____
 HOTLINE 1____
 COS LINE 1 IS 0____
 COS LINE 2 IS 0____
 COS LINE 3 IS 0____
 COS LINE 4 IS 0____
 COS LINE 5 IS 0____
 COS LINE 6 IS 0____
 COS LINE 7 IS 0____
 COS LINE 8 IS 0____
 COS LINE 9 IS 0____
 COS LINE 10 IS 0____
 COS LINE 11 IS 0____
 COS LINE 12 IS 0____
 COS LINE 13 IS 0____
 COS LINE 14 IS 0____

COS LINE 15 IS 0____
 COS LINE 16 IS 0____
 CO ACD DY 8..1 00____
 CO AUD DY 16..9 00____
 CO AUD NT 8..1 FF____
 CO AUD NT 16..9 FF____
 CO INC DY 8..1 FF____
 CO INC DY 16..9 FF____
 CO INC NT 8..1 FF____
 CO INC NT 16..9 FF____
 CO OUT DY 8..1 FF____
 CO OUT DY 16..9 FF____
 CO OUT NT 8..1 FF____
 CO OUT NT 16..9 FF____
 INT PG 7..0 03[†]____
 INT CALL WTG NO____
 BGM YES____
 CALL FWD YES____
 HF YES____
 RCV BRG IN YES____
 CO CALL WTG YES____
 UNIV NT ANS YES____

[†] The default assignments for Internal Page Zones (INT PG 7..0) are:

Stations	Default
1-7	03
8-14	05
15-21	09
22-28	11
29-35	21
36-42	41
43-48	81

4.14 When all entries have been made for the station being programmed, press the RETURN key to begin programming the next station.

4.15 When programming is complete, press the ESCAPE key or press the CTRL key and Q keys simultaneously to end programming. The following message should appear:

DONE

4.16 If the PRT-STN ERROR message appears, an error has been made in the P: PORTS program. This error must be corrected before proceeding.

NOTE: After programming is complete, the SMDR printer (if installed) will be enabled.

CAUTION: AFTER PROGRAMMING, ALWAYS PRESS THE RESET SWITCH ON THE CPU PCB. THIS MUST BE DONE TO INSURE THAT ALL THE ENTRIES YOU MADE ARE LOADED INTO SYSTEM MEMORY.

CAUTION: AFTER THE CPU RESET SWITCH IS PRESSED, OR ANY TIME THE SYSTEM IS TURNED OFF AND ON, THE HANDSET ON EACH SINGLE LINE AND ONE BUTTON TELEPHONE MUST BE CYCLED (OFF HOOK, THEN ON HOOK).





EK-824/1232/1648
ELECTRONIC KEY TELEPHONE SYSTEM
SECTION 8, THEORY OF OPERATION

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1. INTRODUCTION

1.01 The THEORY OF OPERATION Section presents the module (plug-replaceable unit) level theory of operation for the system. It is to be used with Section 9, MAINTENANCE, to allow the service technician to isolate system troubles to the plug-replaceable unit. This section is divided into five parts: Introduction, System Description, Printed Circuit Boards, Telephones and Analysis of Signal Flow.

1.02 Part 1, Introduction, is what you are reading now. Part 2, System Description, provides the Hardware and Software Overview. This part also contains the System Summary, which is a general discussion of how the components of the system function together. Part 3, Printed Circuit Boards, consists of an explanation and block diagram for each Printed Circuit Board (PCB) in the system. An evaluation of each telephone instrument is presented in Part 4, Telephones. Part 5 is the Analysis of Signal Flow. This part is used to explain what happens when a user receives an outside call, places an outside call, or places an Intercom call.

2. SYSTEM DESCRIPTION

HARDWARE OVERVIEW

2.01 The Key Service Unit (KSU) contains the plug-in Printed Circuit Boards (PCBs) that serve as the common equipment between the system telephones, incoming telephone company (telco) or PBX lines, and the optional equipment. A network of microprocessors in the KSU work with the system software and microprocessors in each telephone. This allows internal and external traffic to be processed on a real time basis (i.e., without delay).

Printed Circuit Boards

2.02 The system (Figure 8-1) uses the following common equipment Printed Circuit Boards:

B-CPU-B (Central Processing Unit) PCB

2.03 The B-CPU-B PCB contains the Z80 executive microprocessor, the 6502 traffic control microprocessor, and the system operating software and memory. The B-CPU-B also contains the Common RAM (Random Access Memory) circuits which interface the Z80 executive microprocessor to the 6502 traffic controller.

B-TGU-B (Tone Generator Unit) PCB

2.04 This PCB provides system tones. Dual Tone Multifrequency (DTMF) generators and receivers for processing telephone dial commands, and amplifiers for Background Music (BGM), Music on Hold (MOH) and Page. The B-TGU-B PCB also contains an analog switch matrix (crosspoints) to connect the tones and amplifiers to the stations and the incoming lines.

B-8SCU-C (Station Control Unit) PCB

2.05 The Station Control Unit (B-8SCU-C) PCB is used to connect key telephones to the system. Each B-8SCU-C PCB has the data and power circuits for eight stations, as well as the crosspoints to link the system analog (speech) paths to each station.

B-8SLU-B (Single Line Unit) PCB

2.06 The B-8SLU-B PCB connects eight single line (2500 type) telephones with special ringers to the system.

B-4COU-A (Central Office Unit) PCB

2.07 This Printed Circuit Board is used to interface four Central Office (CO) or Private Branch Exchange (PBX) lines to the system. This PCB also contains circuitry for ring detection, DC loop supervision, and multiline conferencing.

System Capacity

2.08 An EK-824 system can contain up to three B-8SCU-C or B-8SLU-B PCBs (for station ports 1-24), and up to two B-4COU-A PCBs (for lines 1-8). An EK-1232 system can contain up to four B-8SCU-C or B-8SLU-B PCBs (for station ports 1-32), and up to three B-4COU-A PCBs (for lines 1-12). The EK-1648 system can accept up to six B-8SCU-C or B-8SLU-B PCBs (for station ports 1-48), and up to four B-4COU-A PCBs (for lines 1-16). A single B-TGU-B PCB (B-TGU-B1) can support a fully loaded EK-824, EK-1232 or EK-1648 KSU. Another B-TGU-B PCB (B-TGU-B2) may be used in an EK-1232 or EK-1648 KSU to provide additional DTMF receivers and/or generators. Refer to Section 3. HARDWARE CONFIGURATION.

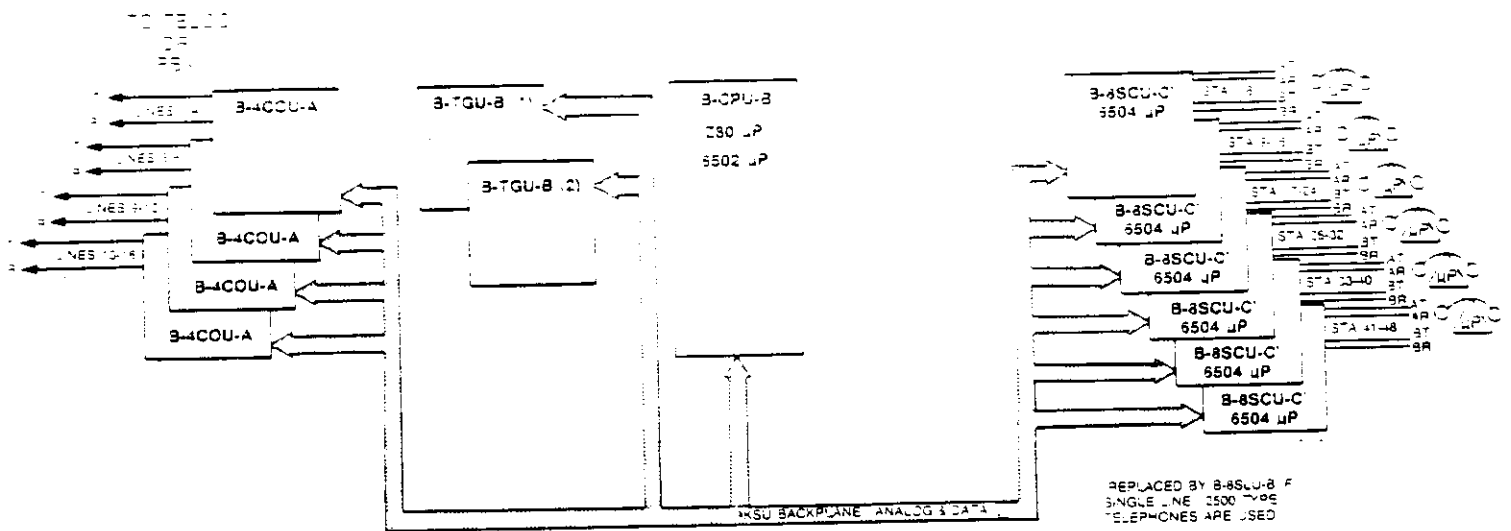


Figure 8-1 SYSTEM BLOCK DIAGRAM, EK-824/1232/1648

System Summary

2.09 The B-CPU-B PCB is the Central Processing Unit for the system. It uses a Z80 executive microprocessor and stored programs to make system traffic processing decisions. The Z80 communicates with a 6502 traffic control microprocessor to monitor the status of all stations and lines. The user can program selected configuration options by using a programming terminal, connected to the Z80 through the KSU RS-232-C data port.

2.10 The 6502, under Z80 control, sends commands and receives interrupts from the B-4COU-A, B-8SCU-C and B-8SLU-B PCBs in the system. It provides, through the 6502 Data Bus, the signals that control the voice connections (analog crosspoints) between the telephones and the telephone company network.

2.11 Dual Tone Multifrequency (DTMF) circuits in the B-TGU-B PCB(s) process dial commands from every station. In addition, the B-TGU-B PCB provides tone generators for system supervisory tones, and amplifiers for Background Music, Music on Hold and Page.

2.12 The B-8SCU-C PCB carries both voice band and digital control information to the system key telephones. Communication between the KSU and the telephones is over four conductor cable. The audio is connected to the telephone over the 'B' conductor pair. Control data, with DC power for the telephones simplex over it, is connected to the telephone 'A' conductor pair.

2.13 Single line (2500 type) telephones with special electronic ringers are connected to the system by B-8SLU-B PCBs. The special electronic ringers are DC powered and must be approved by TIE communications, Inc. The single line telephone 'A' conductor pair carries audio, the DC loop current, and the "battery voltage" required by the single line set. The 'B' conductor pair supplies DC power and/or ringer control, depending on the special electronic ringer used.

2.14 The system has the maximum capacity of 48 stations and 16 outside lines, depending on the KSU and the number of PCBs used. DC circuit power is derived from a separate power supply.

Analog (Audio) Connections

2.15 The analog network (Figure 8-2) connects the audio (speech) circuits of the telephones to each other, to the tone generators and DTMF circuits in the B-TGU-B PCB(s), and to the outside lines. There are 28 talkpaths (audio paths) in the EK-1648 system. Sixteen talkpaths are for the Direct Access Lines (lines 1-16). The remaining 12 are for the 10 Intercom links, Page and Background Music. The EK-1232 system has 24 talkpaths (12 lines, 10 links, Page and BGM), and the EK-824 system has 20 talkpaths (8 lines, 10 links, Page and BGM). Note that one of the 10 Intercom links is always reserved for CO line ringing. The audio connections in the KSU backplane are formed into two busses: the Direct Access Line Bus and the Link Bus.

Direct Access Line Bus

2.16 The lines in the system are the Direct Access Lines, connected to the B-4COU-A PCBs in the KSU. The audio circuits for each line are connected to discrete paths in the Direct Access Bus. The bus presents audio for the Direct Access Lines to each of the B-8SCU-C PCBs. These lines are termed Direct Access Lines since they can be connected to any station through a single crosspoint (digitally controlled analog switch) closure on a B-8SCU-C or B-8SLU-B PCB.

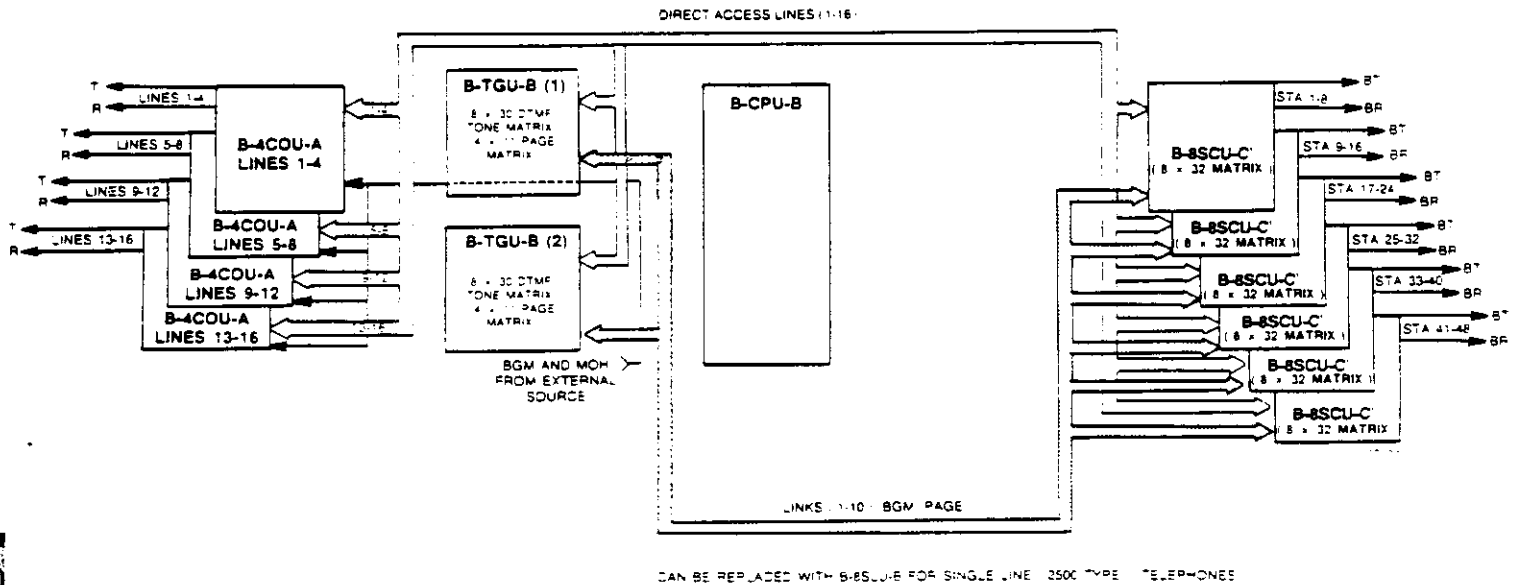


Figure 8-2 ANALOG (AUDIO) CONNECTIONS. EK-824/1232/1648

2.17 The Direct Access Bus also connects the Direct Access Lines to the B-TGU-B PCBs. These PCBs interact with the lines to process dial commands and send supervisory tones back to the telephone.

Link Bus

2.18 The Link Bus is principally used to carry the Intercom traffic. It is comprised of 10 Intercom links (analog paths), a Page link and a Background Music (BGM) link. The KSU backplane circuitry connects the Link Bus to the B-8SCU-C and/or B-8SLU-B PCBs. One Intercom link is used when two stations are connected on an Intercom call. Key telephone voice information is connected to the B-8SCU-C PCBs over the station cable 'B' pair. Single line (2500 type) voice information is connected to the B-8SLU-B PCBs over the station cable 'A' pair.

2.19 The B-TGU-B PCBs are also connected to the Link Bus. This allows for dial command processing (as with the Direct Access Lines) and provides supervisory tones for each station using the Intercom. In addition, the B-TGU-B PCB contains the Page and Background Music amplifiers. Amplified Page and BGM signals are sent throughout the system on the dedicated Page and BGM links.

Data Connections

2.20 Data communication between the PCBs in the KSU is over two backplane data busses (Figure 8-3): the Z80 Data Bus and the 6502 Data Bus.

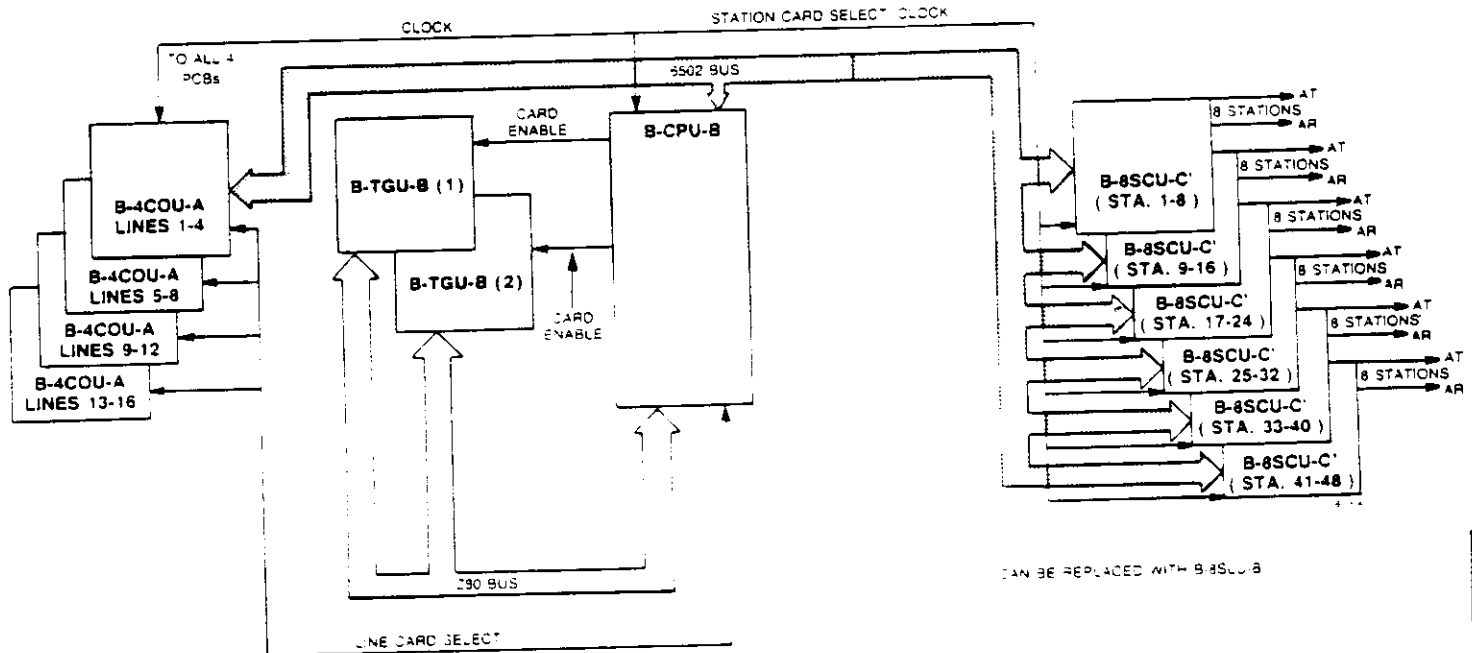


Figure 8-3 DATA CONNECTIONS, EK-824/1232/1648

Z80 Data Bus

2.21 The Z80 Data Bus is connected to the Z80 microprocessor and the Z80 family of components (called the Z80 chip set). The system memory and the B-TGU-B PCB(s) are also on the Z80 Bus. The Z80 Data Bus permits the Z80 executive microprocessor to communicate (through data buffers) to these system elements without interference from other components in the system.

6502 Data Bus

2.22 The 6502 Data Bus is driven by the 6502 traffic control microprocessor and its chip set. It establishes a network of buffered handshake and control signals that link the 6502 traffic control microprocessor to the B-4COU-A PCBs and the B-8SLU-B/ B-8SCU-C PCBs. This structure allows the status of these circuit boards to be supervised independently of the Z80 executive. The 6502 traffic control microprocessor and the Z80 executive microprocessor communicate with each other through common interface circuitry called the Common RAM (Common Random Access Memory). The Common RAM will be discussed later on.

Other Digital Signals

2.23 There are other important digital (data) signals in the KSU, in addition to the main data busses. Each B-8SCU-C and B-8SLU-B PCB is controlled by an individual Station Card Select signal from the 6502 microprocessor. The B-4COU-A PCBs are similarly controlled by individual Line Card Select signals.

2.24 To assure synchronous operation, a system clock signal is shared by the 6502 circuits, the B-4COU-A PCBs and the B-8SLU-B/ B-8SCU-C PCBs.

DC Power Distribution

2.25 DC power for the common equipment PCBs (Figure 8-4) is provided by a separate convection cooled power supply. The power supply produces regulated voltages of +5 V DC, +24 V DC and -24 V DC. These voltages are connected in the KSU backplane to all the PCBs. Each PCB in the system uses additional on-board DC regulation to maximize circuit stability and reliability.

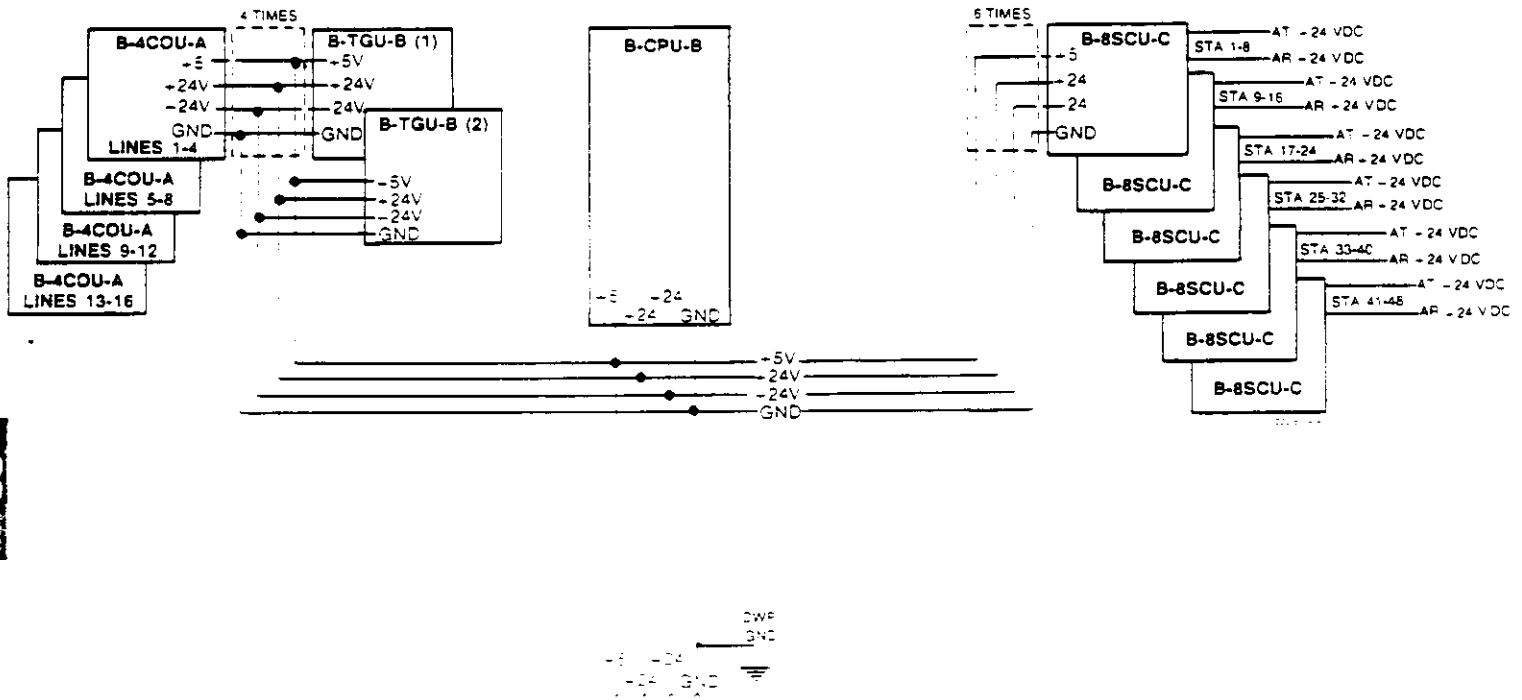


Figure 8-4 DC POWER DISTRIBUTION, EK-824/1232/1648

2.26 A temperature sensing device in the KSU works with circuitry in the power supply to monitor the temperature inside the KSU. When the maximum allowable temperature inside the KSU is exceeded (greater than 120 degrees F), the temperature sensing device provides a contact closure to the power supply. In EK-1648 systems using the B-PSU-A power supply, the power supply will shut down when this closure is detected. In systems using the B-PSU-B and P-PSU-E power supplies, the closure causes the reset switch on the front of the power supply to pop up, revealing a white band. The B-PSU-B or B-PSU-E power supply does not shut down.

SOFTWARE OVERVIEW

2.27 The software is structured in a three-tier hierarchy. This maximizes the efficiency of the Z80 executive microprocessor, the 6502 traffic control microprocessor and the 6504 station processors.

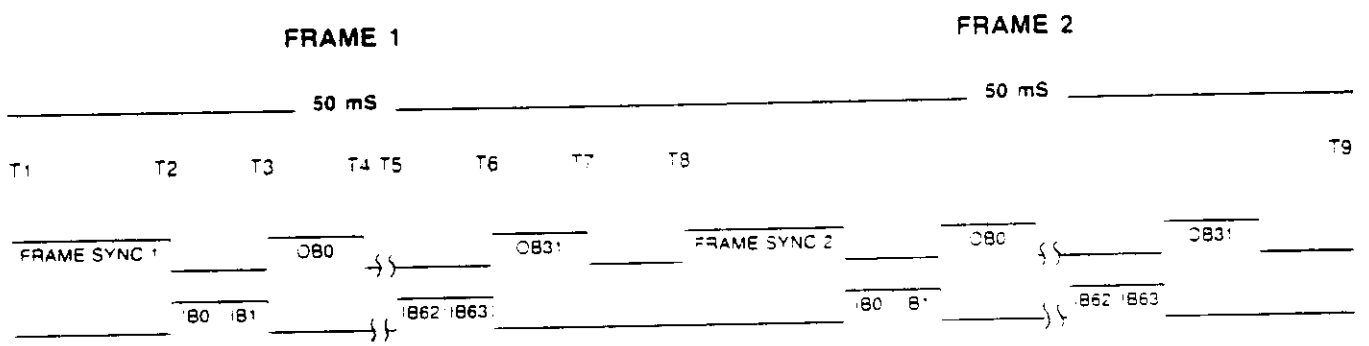
6504 Station Processor

2.28 The 6504 station processor is the first tier in the hierarchy. Each B-8SCU-C PCB has a 6504 station processor that uses eight serial output ports to communicate with eight key telephones simultaneously. A complete update of telephone status requires two data frames (Figure 8-5). Each frame consumes approximately 50mS, allowing a complete update of telephone status every 100mS.

2.29 A frame consists of 64 outbound data bits (OB0-OB63) and 64 inbound data bits (IB0-IB63). Outbound data bits are sent from the KSU to the telephone, and tell the telephone what to do (e.g., disable the dial pad, light a key LED). Inbound data bits are sent from the telephone to the KSU, and tell the KSU what the telephone user wants to do (e.g., seize a line, dial a digit). Each frame is preceded by a frame sync pulse, which synchronizes the 6504 processor in the B-8SCU-C PCB to the processor in the telephone.

2.30 A data bit is assigned a unique function. The status of the data bit determines the status of the function to which it is assigned. The assignments never change, and are the same for all key telephones. For example, outbound bit OB0 is reserved for microphone mute. If the telephone microprocessor sees the bit set (on), it will mute the microphone. If the bit is cleared (off), the telephone microphone will not be muted.

2.31 To begin the serial signaling, the KSU sends a frame sync pulse (T1) to the telephone. The telephone responds by sending back bits IB0 and IB1 (T2) to the KSU. Once this data settles, the KSU transmits bit OB0 (T3). The sequence continues until the entire frame (T7) has been sent. The second frame (T8-T9) is sent in the same format. The inbound data bits are half as long as the outbound data bits, allowing incoming status information to be sent to the KSU twice as often. Data for all eight telephones is loaded into the processor simultaneously. All eight ports send frame sync pulses at the same time, receive incoming bits IB0 and IB1 at the same time, etc.



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Figure 8-5 DATA FORMAT, EK-824/1232/1648

6502 Traffic Control Processor

2.32 The 6502 traffic control processor is the second tier.

It monitors the 6504 for telephone status changes, and is in turn monitored by the Z80 executive. The 6504 station processor sets a status flag if there is any change of state in the telephone (for example, if a user tries to place a call). The 6502 traffic controller polls each B-8SCU-C PCB and looks for these status flags. If it finds one set, it pulls the data from the appropriate 6504 in parallel across the 6502 Data Bus and sets its own status flag. The Z80 executive continually polls the 6502 traffic controller, looking for a set status flag. If it finds one, it takes the data in parallel from the 6502 and processes it. Commands from the Z80 executive to the telephone use the inverse of this relationship. The 6502 also polls the B-4COU-A PCBs, looking for line status (Ring Detect, etc.).

2.33 To communicate with the B-4COU-A, B-8SCU-C and B-8SLU-B PCBs, the 6502 uses card enable signals (interrupts) in conjunction with system address and read/write controls. In other words, before the 6502 can look at a PCB, two conditions must be met: the PCB must be receiving a card enable signal (Line Card Enable or Station Card Enable) and the PCB must be correctly addressed (i.e., have the correct combination of bus address signals). The read/write controls determine whether the 6502 is writing (sending data) into the card or reading (receiving data) from it.

Z80 Executive Microprocessor

2.34 The Z80 executive microprocessor is the third tier, and makes virtually all the traffic processing decisions for the system. The three-tier scheme dramatically increases the efficiency and speed with which the Z80 makes these decisions. If the system is idle, the Z80 does nothing more than poll for status changes. When the Z80 has to process a call, it processes only the call indicated. This is a tremendous advantage over systems that require the executive microprocessor to Time Division Multiplex even, bit for even, telephone.

3. PRINTED CIRCUIT BOARDS

B-CPU-B CENTRAL PROCESSING UNIT PCB

3.01 The B-CPU-B PCB (Figure 8-6) contains the microprocessor, memory elements and control circuits that allow all system traffic to be under direct executive program control. The B-CPU-B is structured around the Z80 executive microprocessor and the 6502 traffic control microprocessor, communicating with each other through common interface circuitry (the Common RAM).

The Z80 Chip Set and System Memory

3.02 The Z80 is a full featured, eight bit microprocessor.

It is directly connected to the Z80 chip set: the Z80 Parallel Input/Output (PIO) circuit, the Z80 Counter/Timer (CTC) circuit, and the Z80 Dual Asynchronous Receiver/Transmitter (DART) circuit. The outputs of the Z80 and the Z80 chip set provide the signals for the Z80 Data Bus.

3.03 The Z80 PIO is a dual port input/output device.

Channel A of the PIO looks at the settings of the eight-bit data option switch, and sends the switch status to the Z80. This switch is used to match the output of the RS-232-C port to the requirements of the programming/SMDR terminal. The B channel of the PIO generates the system reset signal (to the B-8SLU-B and B-8SCU-C PCBs) and the 6502 traffic reset signal. It also selects the block (map) of system memory that the Z80 will address. (The system uses a three map memory mapping technique to extend the memory capacity of the Z80 past its normal limits.) The PIO B channel and reset switch S1 provide the inputs to the watchdog timer. If the PIO stops outputting data, or S1 is pressed, a reset signal is sent to the Z80. Additionally, the PIO drives Z80 status LED DS1. This LED flashes 250mS on and 250mS off to indicate that the Z80 executive microprocessor is running. The PIO also can control the Z80-6502 common interface circuitry, the Common RAM.

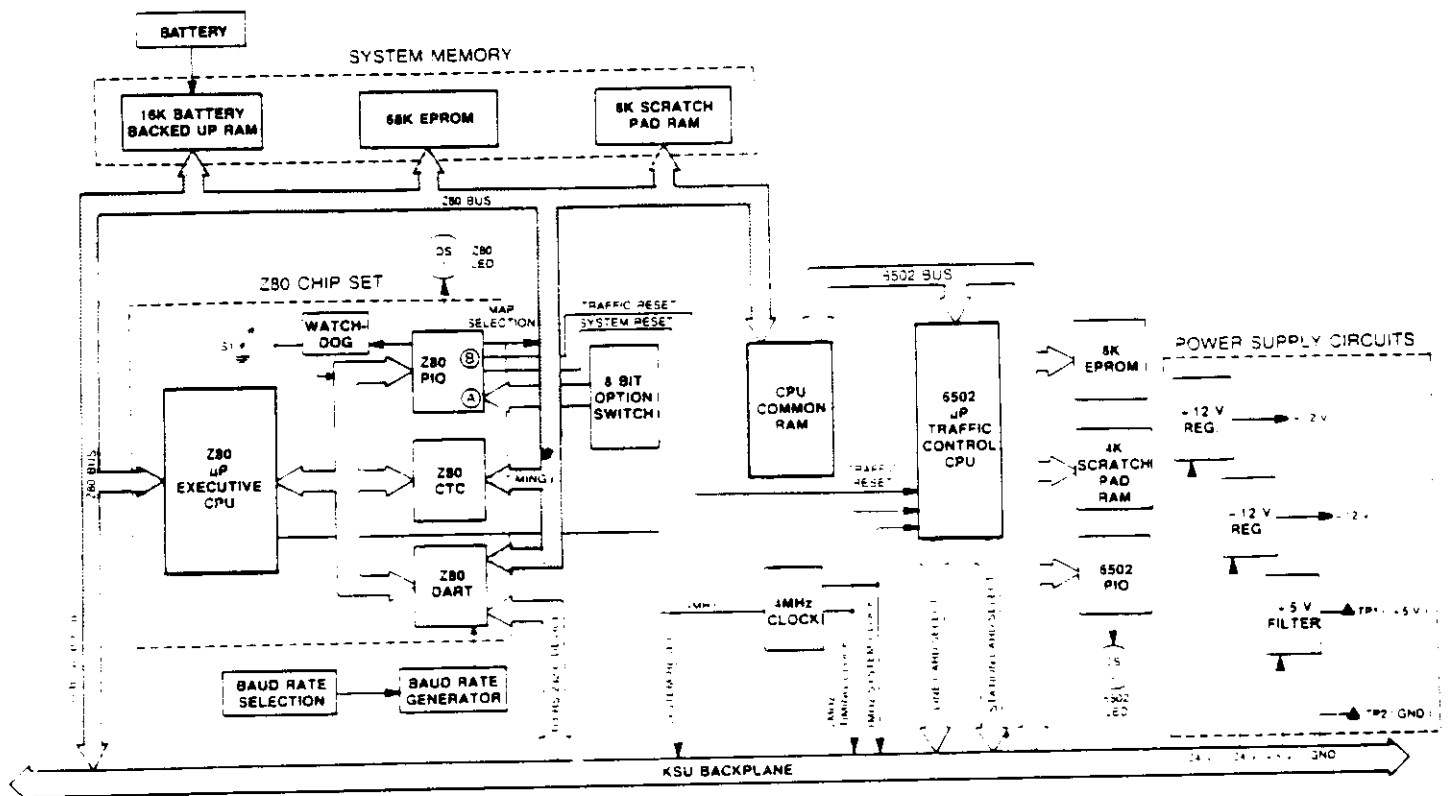
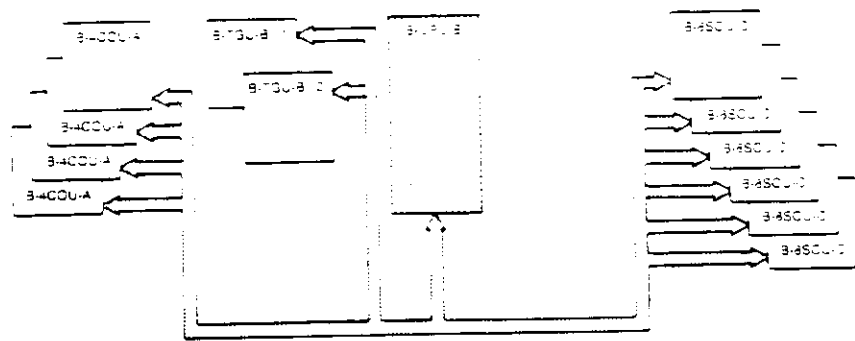


Figure 8-6 B-CPU-B CENTRAL PROCESSING UNIT PCB BLOCK DIAGRAM, EK-824/1232/1648

3.04 The Z80 CTC sets the timing for the Z80. It provides the intervals used for the various flash rates and tone signals. It also controls the B-CPU-B PCB system clock.

3.05 The Dual Asynchronous Receiver/Transmitter (DART) is a bi-directional, two port device. The A port is connected to the RS-232-C programming/SMDR port. This permits an external terminal or teleprinter to be used to program system options and record Station Message Detail Recording (SMDR) data. This port is also connected to the crystal-driven Baud Rate Generator. The Baud Rate Generator matches the speed of the DART A port to the speed of the external terminal. This allows for error free communication between the Z80 and the terminal. The DART B port is currently not used.

3.06 The Z80 executive is connected over the Z80 Data Bus to the system memory. This memory consists of 68K of Erasable Programmable Read Only Memory (EPROM), 16K of battery backed-up Random Access Memory (RAM), and 8K of scratch pad RAM. The EPROM contains the system operating software. This software is factory installed and cannot be erased or altered. The 16K of battery backed-up RAM is used to store the programmable system options and Speed Dial numbers. The scratch pad RAM is used by the B-CPU-B for temporary storage of data during traffic processing.

The 6502 Chip Set

3.07 The 6502 traffic control microprocessor is a sophisticated eight bit microprocessor, somewhat less capable than the Z80. Its main function is to monitor the 6504 station processors (in the B-8SCU-C/B-8SLU-B PCBs) for call activity. The traffic control microprocessor also is responsible for display telephone message generation and Dial Pulse control. The 6502 works with its own chip set: the 8K traffic control EPROM, the 4K traffic control scratch pad RAM, and the 6502 PIO.

3.08 The 8K traffic control EPROM stores the 6502 factory-installed operating software. The 4K RAM is used during traffic processing, and is not battery backed-up. The 6502 PIO is similar to the Z80 PIO, and is used to control the common interface circuitry (the Common RAM). The PIO also flashes the 6502 status LED DS2 approximately one second on and two seconds off. The 6502 chip set outputs to the 6502 Data Bus, which is extended throughout the KSU backplane to the system PCBs.

3.09 Control interrupts are sent to the B-4COU-A PCBs and the B-8SCU-C/B-8SLU-B PCBs. The interrupts sent to the B-4COU-A PCBs are the Line Card Select signals. The interrupts sent to the B-8SCU-C/B-8SLU-B PCBs are the Station Card Select signals. The system uses these control interrupts to attach a PCB to the 6502 Data Bus for processing.

CPU Common RAM

3.10 The CPU Common RAM is the interface between the Z80 and 6502 microprocessors (Figure 8-7). The Common RAM frees the Z80 executive from the burden of repetitive polling of all the stations in the system. This structure increases the efficiency of both the Z80 executive and 6502 traffic controller since the two processors do not have to run in synchronization.

3.11 The CPU Common RAM functions as a dual directional, interrupt driven data buffer. For example, if the 6502 sees the status flag for a 6504 station processor set, it pulls the data from the 6504 and loads it into the common RAM. The 6502 notifies the Z80 that information is waiting. The Z80 then reads the data from Common RAM and processes it. Similarly, data output from the Z80 is buffered in the Common RAM until pulled out by the 6502. Access to the CPU Common RAM is controlled by the Z80 and 6502 PIO circuits. The Station Common RAM is discussed in paragraph 3.31.

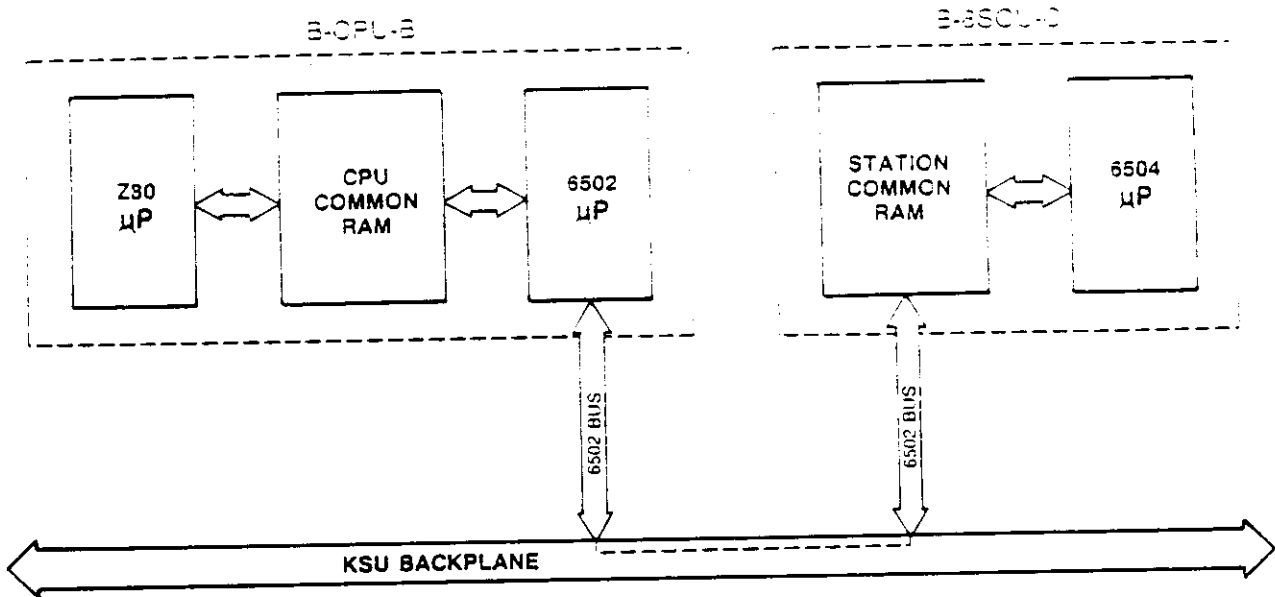


Figure 8-7 CPU COMMON RAM, EK-824/1232/1648

System Clocks

3.12 All synchronous system timing is based on the 4MHz crystal-controlled clock. The clock circuitry outputs a stable 4MHz to the Z80. It also generates a 2MHz timing clock and a 1MHz system clock. These latter signals are connected to the 6502 and all the B-SSCU-C/B-SSLU-B PCBs in the system.

DC Power Distribution

3.13 The B-CPU-B PCB uses the +24 V DC, -24 V DC and +5 V DC from the backplane to drive on-board regulators for circuit power. The +24 V is regulated down to +12 V; the -24 V is regulated to -12 V. The +5 V from the backplane passes through additional filters and is output (TP1) to the B-CPU-B components.

Summary

3.14 The B-CPU-B PCB contains the Z80 executive microprocessor, the 6502 traffic control processor, and the interface circuits that allow these devices to control the system. The processors communicate with each other through the Common RAM. This PCB also contains the system stored operating software, memory and clock circuits. The B-CPU-B PCB is connected to the system over two data buses: the Z80 Data Bus and the 6502 Data Bus.

B-TGU-B TONE GENERATOR UNIT PCB

3.15 The B-TGU-B PCB (Figure S-8) consists of Dual Tone Multifrequency (DTMF) generators and receivers; system tone generators; amplifiers for Background Music (BGM), Music on Hold (MOH) and internal Page Zones; an optional Real Time Clock Daughter Board; and relay contacts to control external ringers and audio equipment. The B-TGU-B is connected directly to the Z80 Data Bus, and is addressed by the Z80 as if it were memory.

DTMF Generators

3.16 DTMF generators accept digital signals from the Z80 Data Bus and convert them to DTMF tones. For telephones with data dialers (such as the multibutton display set), these generators allow dial commands to be sent as part of the telephone serial data stream, processed by the Z80, and then converted to tones by the DTMF generators. The Z80 time shares (multiplexes) the DTMF generators, which allows many calls to be manually dialed without delay. Generators are only seized for an entire dialing sequence when using Speed Dial numbers and Last Number Redial. Input to the DTMF generators is from the Z80 Data Bus. Output is to the DTMF/Tone Matrix (crosspoints). Each B-TGU-B PCB has two DTMF generators. If two B-TGU-B PCBs are installed, the position of an on-board address jumper identifies each PCB to the Z80.

3.17 DTMF receivers accept DTMF tones from the telephones (via the DTMF Tone Matrix) and convert them to digital signals. These signals are sent out on the Z80 Data Bus and received by the Z80 for processing. Single line (2500 type), one button, four button and multibutton telephones (without displays) have DTMF dialers. When one of these telephones places a call, a DTMF Receiver is attached (through a DTMF/Tone Matrix crosspoint) until the dialing is completed, or until a six second timeout occurs. Although the dialed tones are coupled to the telco via the station audio pair, the digital equivalent of the tones is used by the Z80 for Toll Restriction and SMDR purposes. Each B-TGU-B PCB has two on-board DTMF receivers. Two more DTMF receiver daughter boards can be plugged into each B-TGU-B PCB, for a system total of eight.

Tone Generators

3.18 Tone generators produce the various tones used by the system. Tone 1 is a combination of 350Hz and 440Hz, and is used for Intercom dial tone. Tone 2 is a combination of 440Hz and 550Hz, and is used for incoming ring, busy and other supervisory tones. The output from the tone generators is constant. The tone switching is all done in the DTMF/Tone Matrix.

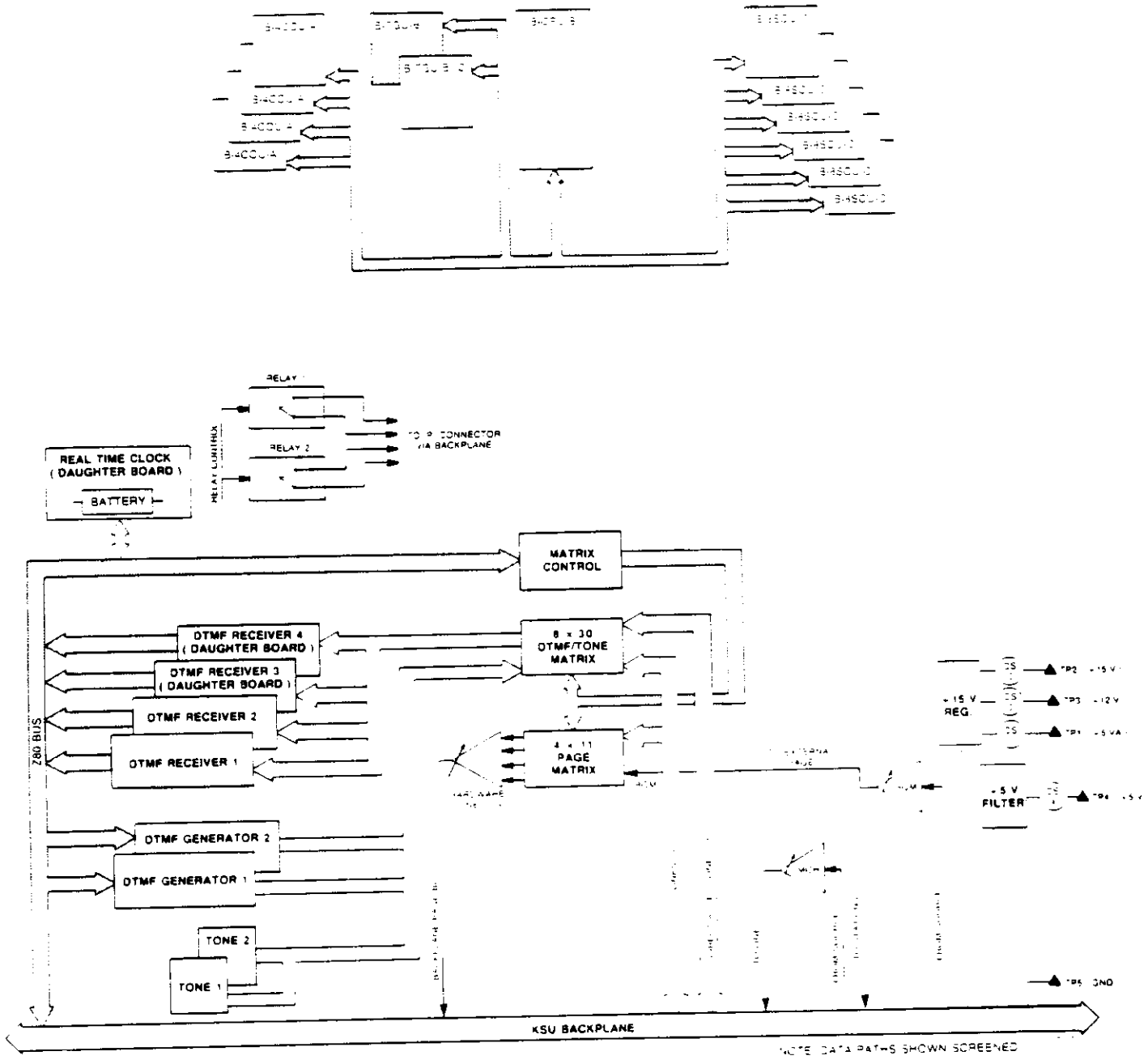


Figure 8-8 B-TGU-B TONE GENERATOR UNIT PCB BLOCK DIAGRAM. EK-824/1232/1648

External Relays

3.19 The B-TGU-B PCB (B-TGU-B1) contains two dry relay contacts, under program control, that can be used to control external paging and loud ring equipment. The relays (designated 1 and 2) receive control signals from the Z80 Data Bus. The relay contacts are connected, through the KSU backplane and a Type 57 'P' connector, to a designated 66M1-50 connecting block on the installation backboard.

Crosspoint Matrixes

3.20 All analog (voice) switching is done in crosspoint matrixes, which are electronic switching circuits controlled by digital signals. Depending on the state of the digital control signals, any input can be connected to any output. A typical crosspoint arrangement is shown in Figure 8-9. In this system, the crosspoint matrixes on the B-TGU-B PCB are controlled by the Matrix Control decoder, which is in turn controlled by the Z80 data bus. There are two crosspoint matrixes: the DTMF Tone Matrix and the Page Matrix.

DTMF/Tone Matrix

3.21 The DTMF Tone Matrix is an 8 X 30 crosspoint array that can connect any combination of the direct access lines or 10 Intercom links to the four DTMF receivers, two DTMF generators or two tone generators. The links and direct access lines connect to the matrix through the KSU backplane. Any 8 X 8 connection can be made at any one time. Although the B-TGU-B PCB can switch up to 20 direct access lines, the number of lines that can be connected is limited by the design of the KSU. Up to 16 lines can be connected when using the EK-1648 KSU, up to 12 lines can be utilized in the EK-1232 KSU, and up to 8 lines can be utilized in the EK-824 KSU.

Page Matrix

3.22 The 4 X 11 Page Matrix is used to connect the 10 Intercom links and Background Music to the four page amplifiers. As shown in Figure 8-10, a paging announcement comes from a telephone into the B-TGU-B on an Intercom link. The matrix in the B-TGU-B connects the link to all of the page amplifiers. Each amplifier sends the paging signal to a specified number of stations (B-8SCU-C PCBs) on the dedicated page link. Refer to Figure 5-15 or 9-2 for amplifier assignment. The first B-TGU-B PCB in the system provides four amplifiers to drive the page links for the KSU. The amplifiers in the second B-TGU-B PCB are not used.

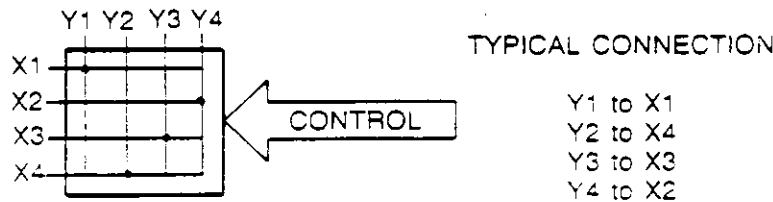


Figure 8-9 CROSSPOINT MATRIX, EK-824/1232/1648

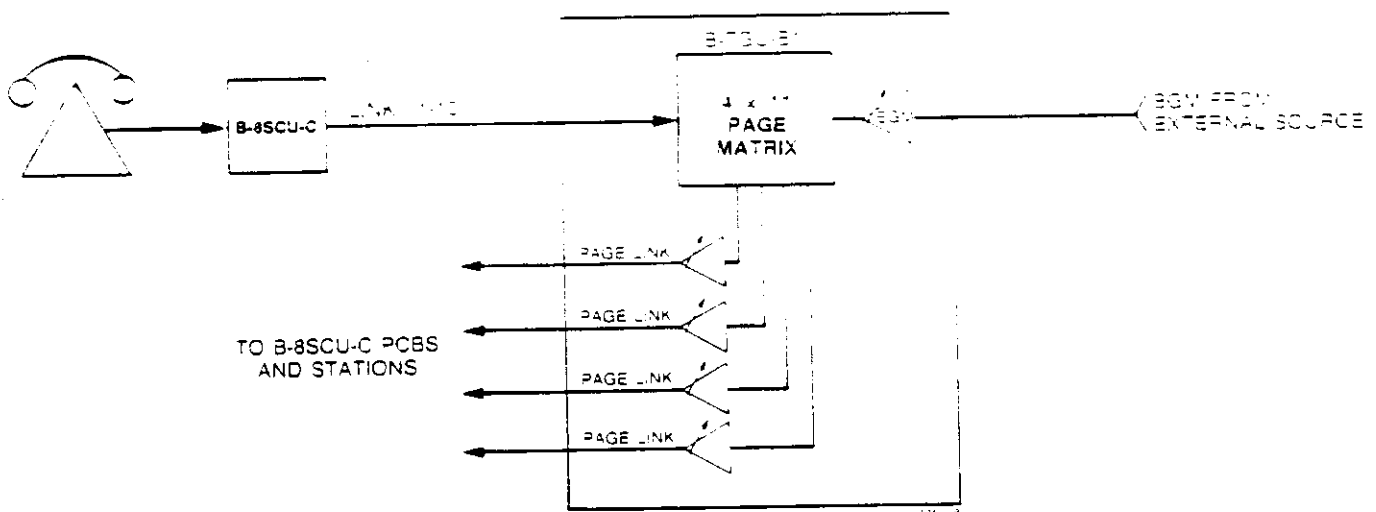


Figure 8-10 PAGING, EK-824/1232/1648

3.23 The paging announcements a station receives are determined by the hardware page zone and the software page zone to which it is assigned. There are four hardware page zones on the B-TGU-B PCB, with one page amplifier in each zone. Each page amplifier on the B-TGU-B PCB drives the page link for a specified number of consecutive station ports. The hardware page zone for a station is derived from the KSU slot its B-8SCU-C PCB is plugged into. (Note that the level of the signal on the page link is regulated by its dedicated potentiometer, located on the front edge the B-TGU-B PCB.) For example, the first page amplifier drives the page link for the B-8SCU-C PCB plugged into slot J12 (J7 on the EK-824 and EK-1232 KSU's). This corresponds to ports 1 through 8.

3.24 The software page zone for a station is determined by how the system software controls the crosspoint matrix on the B-8SCU-C PCB. When a page is made, all the crosspoints in the B-TGU-B PCB page matrix close, enabling all the page links in the system. While the first page is being made, another page (either zone or All Call) cannot be made. The Z80 interprets the page programming, and works with the 6502 traffic controller and the 6504 station processors to cause the crosspoints on each B-8SCU-C PCB to send the announcement to the appropriate key telephones. Since the actual page switching is done in the B-8SCU-C PCB crosspoint matrix, complete flexibility in page zone assignments is obtained. For example, assume that station 301 (port 1) is the only station assigned to page zone 4 in station programming. When another user dials 64 to initiate a zone page, the announcement is amplified in all the B-TGU-B PCB page amplifiers and sent out on all the page links. The page link crosspoint closure in the B-8SCU-C PCB for port 1 (hardware zone 1) closes, sending the announcement only to station 301. Since there are seven software page zones (61-67) and four amplifiers, the hardware page zones and the software page zones are not the same.

Music on Hold and Background Music Amplifiers

3.25 Music on Hold and Background Music from the external music source (s) is connected to the system components through the amplifiers on the B-TGU-B PCB. The Background Music signal from the external source is amplified in the BGM amplifier and sent out to all key stations. It is also sent to the Page amplifiers through the Page Matrix. Music on Hold, from the same or a separate source, is amplified and sent to each line circuit.

Real Time Clock Daughter Board

3.26 The Real Time Clock Daughter Board provides a stable, battery backed-up time source for display telephone displays and the SMDR. Commands to set the clock are sent from the programming terminal or the attendant station and processed by the Z80. The Z80 outputs these commands to the Z80 Data Bus so the time clock can be set. Once set, the time will continue to run, even if system power should fail. The Z80 will periodically address the Real Time Clock to obtain time updates.

On-Board DC Regulation

3.27 The B-TGU-B pulls +24 V and +5 V from the KSU backplane. The +24 V line is input into a regulator that produces +15 V (DS2 and TP2), +12 V (DS3 and TP3) and +5 VA (DS1 and TP1). The +5 V line is additionally conditioned by the +5 V filter (DS4 and TP4).

Summary

3.28 One B-TGU-B PCB (B-TGU-B1) provides two DTMF generators, up to four DTMF receivers, system tones, Page link and music drivers (amplifiers) for the KSU, and two sets of dry external relay contacts. The addition of the second B-TGU-B (B-TGU-B2) provides two more DTMF generators (system total of four) and up to four more DTMF receivers (system total of eight). The EK-824 KSU will not accept a second B-TGU-B PCB.

B-8SCU-C STATION CONTROL UNIT PCB

3.29 The B-8SCU-C PCB (Figure 8-11) is the control unit for eight multibutton and/or four button key stations. The heart of the B-8SCU-C PCB is the 6504 station processor. This processor works with the 6502 traffic controller in the B-CPU-B to monitor the data flow to and from the telephone, and connect the telephone audio path to the outside lines and other stations in the system.

6504 Station Processor Chip Set

3.30 The 6504 station processor is an eight bit microprocessor, with somewhat fewer capabilities than the 6502 traffic control microprocessor. It communicates with the B-CPU-B PCB through the station Common RAM, and with the key stations via the Data and Crosspoint PIOs. The 6504 is supported by 4K X 8 EPROM (containing the station processor operating program) and 2K X 8 RAM.

3.31 The 6504 has two "sides," the 6502 (CPU) side and the station side. The station Common RAM is on the 6502 side. If there is a change-of-state in the data from any of the eight telephones, the change is loaded into the station Common RAM by the 6504. A change-of-state flag is also set. The 6502, using its data bus, periodically polls the station Common RAM. When it sees the change of state flag set, it pulls the data from the Common RAM and works with the Z80 to process it. When data is to be sent to the telephone, the 6502 sends the Station Card Select interrupt to the station Common RAM and loads in the data. The next time the 6504 polls the Common RAM, it accepts the data and sends the change to the telephone.

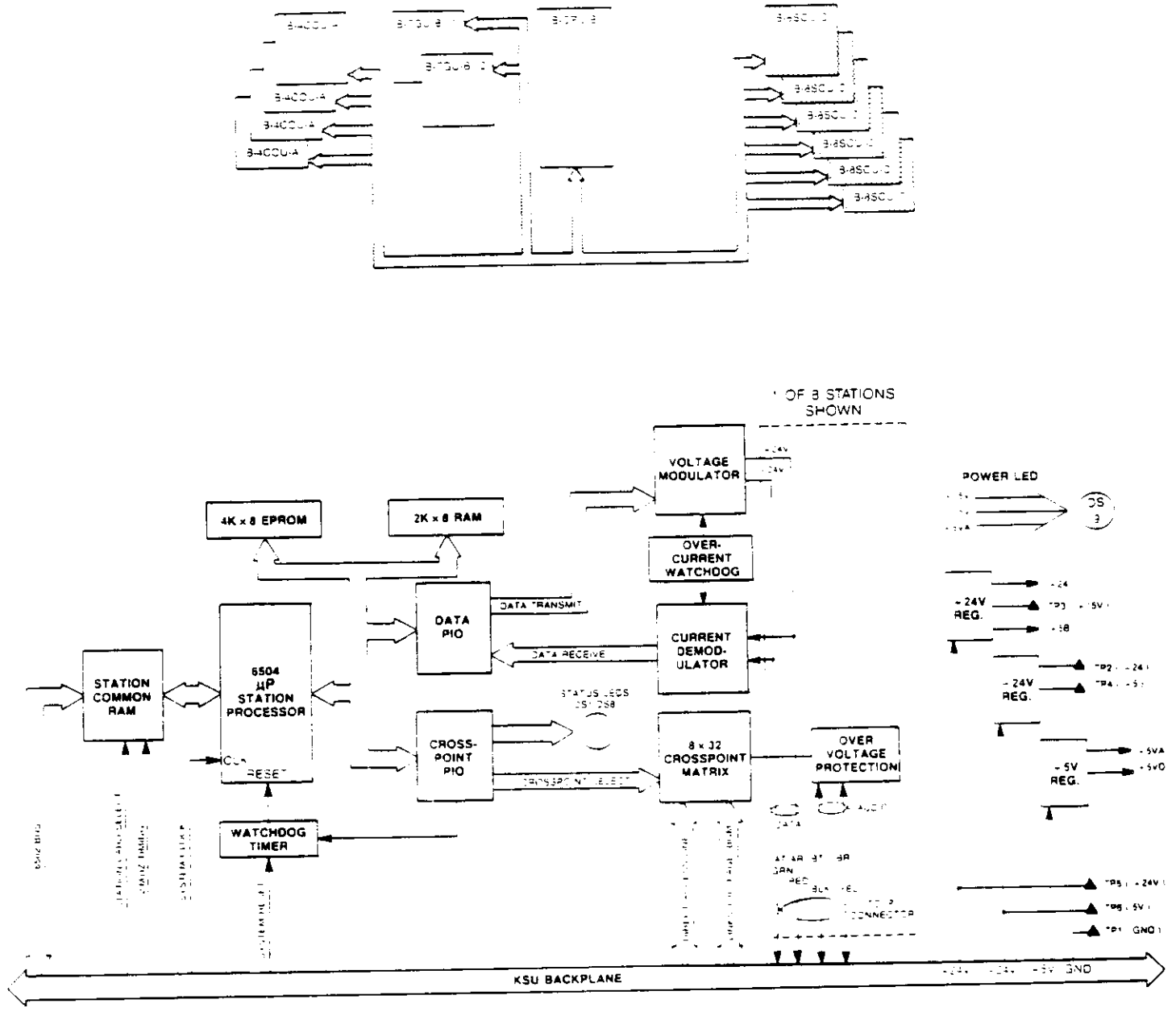


Figure 8-11 B-8SCU-C STATION CONTROL UNIT PCB BLOCK DIAGRAM, EK-824/1232/1648

3.32 The Data PIO and the Crosspoint PIO are on the station side of the 6504. The Crosspoint PIO accepts control data from the 6504 and generates, through its A channel, crosspoint select signals for the station crosspoint matrix. The Crosspoint PIO B channel controls the station status LEDs (DS1 through DS8). The Data PIO is configured for bi-directional operation. The Data PIO sends eight channels of station transmit data to the Voltage Modulator, and receives eight channels of station receive data from the Current Demodulator.

3.33 The 6504 is monitored by the Watchdog Timer. The watchdog receives input from the Crosspoint PIO and the system power-on reset signal. If the Crosspoint PIO stops sending data to the telephones, or a master reset command is received from the B-CPU-B PCB, the 6504 will be reset. If neither of these conditions occurs, the watchdog will be continually refreshed.

Data Receive and Transmit Circuits

3.34 The Data PIO sends and receives eight channels of telephone status data from eight discrete station data circuits. Each station data circuit consists of a Voltage Modulator and a Current Demodulator. Transmit data voltage (from the KSU to the telephone) is input into the Voltage Modulator circuit, which superimposes (simplexes) the data onto the station wire A pair carrying the DC power for the telephone. The green wire carries -24 V and the red wire carries +24 V. The amplitude of the transmitted data is slightly less than 1 volt (250-750mV). Data detectors in the telephone interpret the B-8SCU-C PCB transmit data.

3.35 Inbound data (current) is received on the green and red wires by the Current Demodulator. (Remember that OB data bits are voltage, and IB data bits are current.) The steady state current on the red and green wires is about 77mA. A set data bit will momentarily increase the current by 3-7mA. The receive data (i.e., a set data bit) is current detected by the demodulator and sent to the receive channel on the Data PIO, which in turn sends the data to the 6504. The Current Demodulator inputs a sample into the Over-Current Watchdog. If excessive current is detected, indicating a problem with the telephone, the Voltage Modulator for that telephone is shut down and the station is taken off line. Periodically the station is sampled for corrected current levels. If the problem has gone away, the station is brought back on line.

Station Crosspoint Matrix

3.36 The 8 X 32 Crosspoint Matrix switches audio from the eight telephones onto the 10 Intercom links, the page link, the BGM link and the Direct Access Lines. The matrix is controlled by the Crosspoint PIO. The telephone audio is on the two B pair station wires (black and yellow). The audio wire pair does not carry DC voltage. The B pair is connected to the Overvoltage Protection network before going to the crosspoint matrix.

On-Board DC Regulation

3.37 The B-8SCU-C PCB contains on-board regulators for the +24 V, -24 V and +5 V lines. The -24 V line (TP5) from the backplane is input into the +24 V regulator. This regulator generates -24 V, -15 V (TP3) and -5B. The -24 V regulator outputs -24 V (TP2) and -5 (TP4). The +5 (TP6) regulator produces +5 VA and -5 VD. Power LED DS9 senses +15 V, -5 V and +5 VA. If these voltages are present, DS9 is on. If any of the voltages are incorrect, DS9 is out.

Summary

3.38 The B-8SCU-C PCB is structured around the 6504 station processor and supports eight key stations. The station Common RAM allows the 6504 to carry on its tasks efficiently, communicating with the 6502 traffic control processor only when a change of state is sent or received from the telephone. Data transmission between the KSU and telephone, made possible by the Voltage Modulator and Current Demodulator, is over the station A pair. Station audio, switched in the crosspoint matrix, is on the station B pair.

3.39 Stations communicate with the B-8SCU-C over four conductor station cable, with the wires defined as follows:

DESIGNATION	COLOR	FUNCTION
AT	GRN (green)	-24 V and data
AR	RED (red)	+24 V and data
BT	BLK (black)	Audio
BR	YEL (yellow)	Audio

B-8SLU-B SINGLE LINE UNIT PCB

3.40 The B-8SLU-B PCB (Figure 8-12) is installed in place of the B-8SCU-C PCB if single line (2500 type) or one button telephones are to be used. The B-8SLU-B PCB uses the same 6504 station processor, PIOs, Common RAM and crosspoint matrix as the B-8SCU-C PCB. The single line interface replaces the data receive/transmit circuits used for the key telephones. The B-8SLU-B PCB supports eight single line telephones. Since the single line telephone is not a data telephone, there is no requirement for repetitive polling of the stations.

6504 Station Processor Chip Set

3.41 The 6504 station processor works with the station Common RAM and the 6502 traffic control processor to control the single line telephones. As in the B-8SCU-C PCB, interrupts from the 6502 tell the 6504 to change the status of the telephones. The 6504 in turn can set a status bit to indicate to the 6502 that the telephone user is placing a call. The Watchdog Timer, Station Card Select signal and the system clock serve the same functions as in the B-8SCU-C PCB. The operating software for the single line station processor is contained in the 4K X 8 EPROM.

3.42 The B-8SLU-B Crosspoint PIO performs the same functions as the Crosspoint PIO in the B-8SCU-C PCB. It receives control data from the 6504 and provides crosspoint addresses to the 8 X 30 Crosspoint Matrix. The Crosspoint PIO also drives the station status LEDs (DS1-DS8), and refreshes the Watchdog Timer (along with system reset).

3.43 The Function PIO is required to monitor only three control signals for each telephone, not a constant stream of incoming and outgoing data as in the B-8SCU-C PCB. These signals are: off hook from the telephone, ring enable to the telephone ringer circuit, and mute to the telephone handset. The Single Line Interface circuits for each station connect the Function PIO to these signals.

Single Line Interface

3.44 The B-8SLU-B PCB contains a Single Line Interface circuit for each of the eight telephones it supports. The Single Line Interface provides the 48 V DC, necessary to power the single line telephone, that is normally provided by the telco Central Office battery. The green wire in the A pair sends +24 V DC; the red wire sends -24 V DC. The black wire in the B pair provides ground; the yellow wire provides a current limited +24 V for certain special ringers.

3.45 When the single line (2500 type) telephone is idle, no significant current flows in the A pair. When the user lifts the handset, and the telephone hookswitch contacts close, off hook current flows in the A pair and is sensed by a current detector in the Single Line Interface. The detector sends an off hook digital signal to the Function PIO, which connects to the 6504.

3.46 The command to ring a single line telephone comes from the 6502 traffic controller in the B-CPU-B. It is interpreted by the 6504 and is sent to the Single Line Interface by the Function PIO. The Single Line Interface then grounds the +24 V line (the green wire in the A pair). This condition is monitored by the components on the Special Loud Ringer Board, which then excites the ringer in the telephone.

3.47 The third Function PIO control signal is for handset muting. During Speed Dialing, the mute circuit in the Single Line Interface is enabled so that the Speed Dial digits are muted in the telephone handset receiver.

3.48 The current mode strap in the Single Line Interface is used to match the current capacity of the A pair to the type of telephone used. The low current mode (strap E2 to E3) is used for the One Button Single Line Telephone and Off Premise Extensions. The high current mode (strap E1 to E2) is for standard 2500 type single line telephones.

Crosspoint Matrix

3.49 The B-8SLU-B switches telephone audio in the 8 X 30 Crosspoint Matrix. Audio from eight telephones can be connected to any of the Direct Access Lines or the 10 Intercom links. The matrix does not use crosspoints for BGM and Page, since single line telephones do not have speakers to receive these signals. The outputs of the crosspoints are connected to the telephone through the A pair.

On-Board DC Regulation

3.50 On-board DC regulators use the +24 V, -24 V and -5 V from the KSLU backplane. The +24 V regulator generates +24 VL for the A pair green wire, -15 V (TP3), and -24 V current limited (TP5) for the B pair yellow wire. The -24 V regulator outputs -24 VL (TP2) for the A pair red wire. The +5 V line (TP6) is regulated to +5 VA and +5 VD. Power LED DS9 senses +15 V, -5 V and +5 VA. If these voltages are present, DS9 is on. If any of the voltages are incorrect, DS9 is out.

Summary

3.51 The B-8SLU-B PCB connects eight single line (2500 type) or one button telephones to the system. This PCB is similar in most respects to the B-8SCU-C PCB used for the key telephones, except that the Single Line Interface is used in place of the receive and transmit data circuits. The B-8SLU-B PCB provides each telephone with power (+/-24 V DC), off hook loop current detection, an audio path and circuits to excite the special ringers.

B-4COU-A CENTRAL OFFICE UNIT PCB

3.52 Each B-4COU-A PCB (Figure 8-13) contains the circuits to connect four Central Office or PBX lines to the system. This circuit board provides incoming ring detection, loop supervision, loop relay enable (line seize), Conference balancing, Music on Hold and audio amplifier circuits for each of the four lines. The B-4COU-A PCB is controlled by the 6502 traffic control processor, over the 6502 Data Bus.

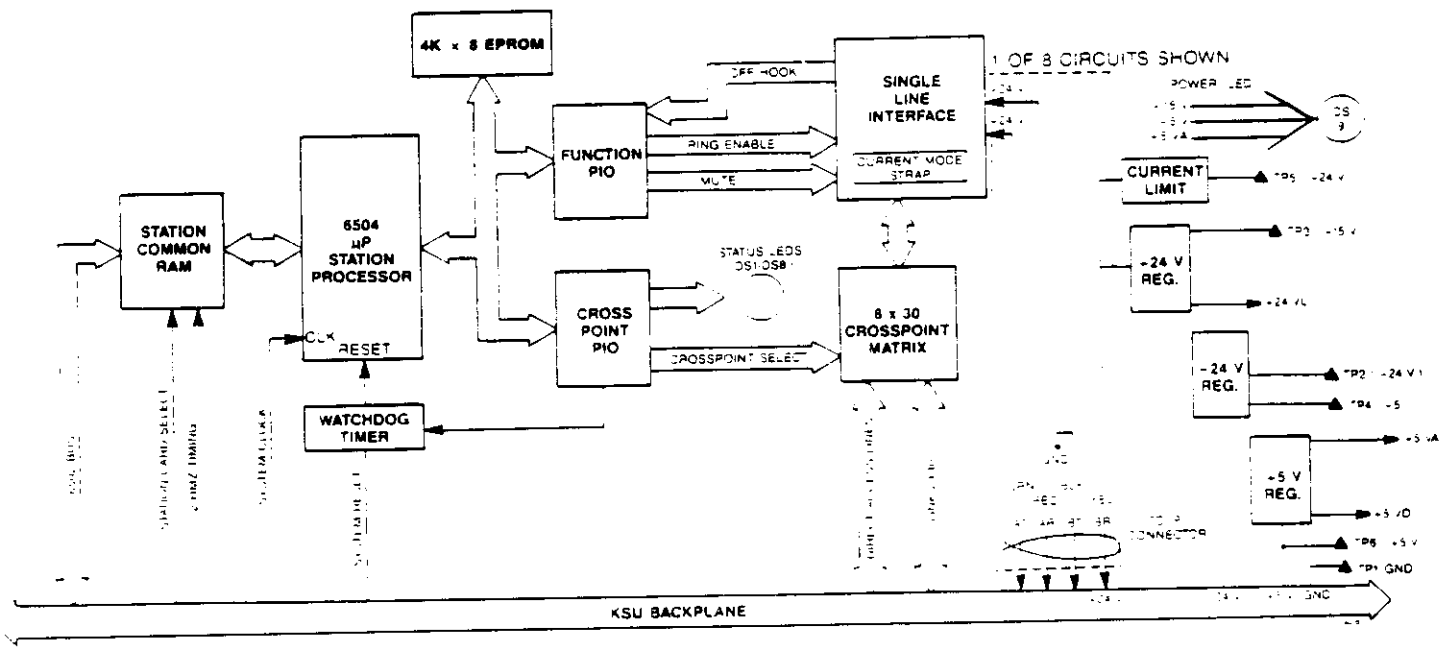
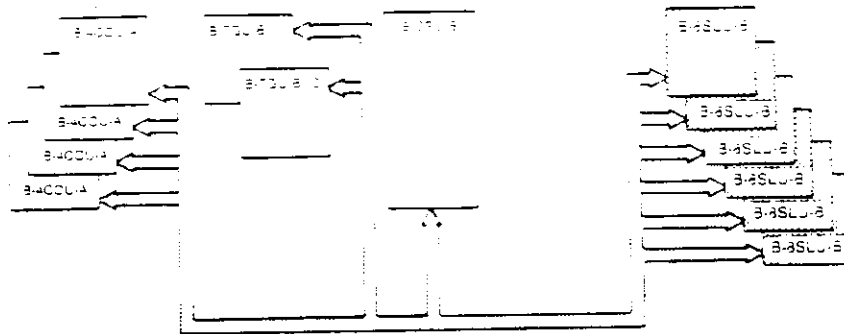


Figure 8-12 B-8SLU-B SINGLE LINE UNIT PCB BLOCK DIAGRAM, EK-824/1232/1648

Front End and Ring Detection

3.53 Tip (TP102) and Ring (TP101) are connected from the RJ21X connector, through the KSU backplane, to the input protection network in the B-4COU-A PCB. This network prevents excessively high input voltages (high voltage transients from lightning, etc.) from damaging the circuits on the PCB. Voltages in excess of 260 V DC are shunted to the system cold water pipe ground.

3.54 An AC ring signal from the line, typically 90 V AC, is detected in the supervision circuits. The ring signal is rectified (changed to DC) and converted to a digital line status signal by the Ring Pulse Stretcher. The line status signal from each of the four line circuits is presented to the Ring Detect Multiplexer. This multiplexer sends line status (ring detect) data to the B-CPU-B when addressed by the 6502.

3.55 When a line is to be seized for answering or placing a call, the seize command is sent by the 6502, down its data bus, to the Loop Relay Enable Decoder. The decoder then sends an enable signal to the loop relay for the line to be seized. When the line is seized, an LED (DS101 for line 1) is illuminated.

3.56 The Loop Relay and Supervision Circuits are also used when a line is on Hold and/or when Dial Pulse dialing is required. When a line is placed on Hold, the audio connection between the line and the system is dropped, while DC holding current is maintained in the loop relay. During Dial Pulse dialing, the 6502 sends pulsed enable signals to the line loop relay that correspond to the digits to be dialed. The supervision circuits are also used to detect a far-end disconnect pulse, which occurs when an outside party placed on Hold hangs up. This facility must be provided by the PBX or telco switching equipment that the system is hooked up to.

Audio Circuits

3.57 Line audio is AC coupled from Tip and Ring to a bi-directional audio amplifier. This circuit is designed to ensure that the level of incoming audio is correctly balanced against the level of outgoing audio. Line audio is connected to the backplane as a Direct Access Line signal.

Conference and Music on Hold

3.58 The Conference Balancing Network is enabled if a line is to be joined in Conference with another line and a station. The network introduces impedance adjusting circuits that maintain the correct level and balance of the voice from all three parties in the Conference. This circuit is not used when a Conference is established between two inside parties and one outside party. Control signals from the B-CPU-B PCB via the 6502 Data Bus, into the Conference/MOH Decoder, determine when the Conference Balancing Network will be switched onto a line.

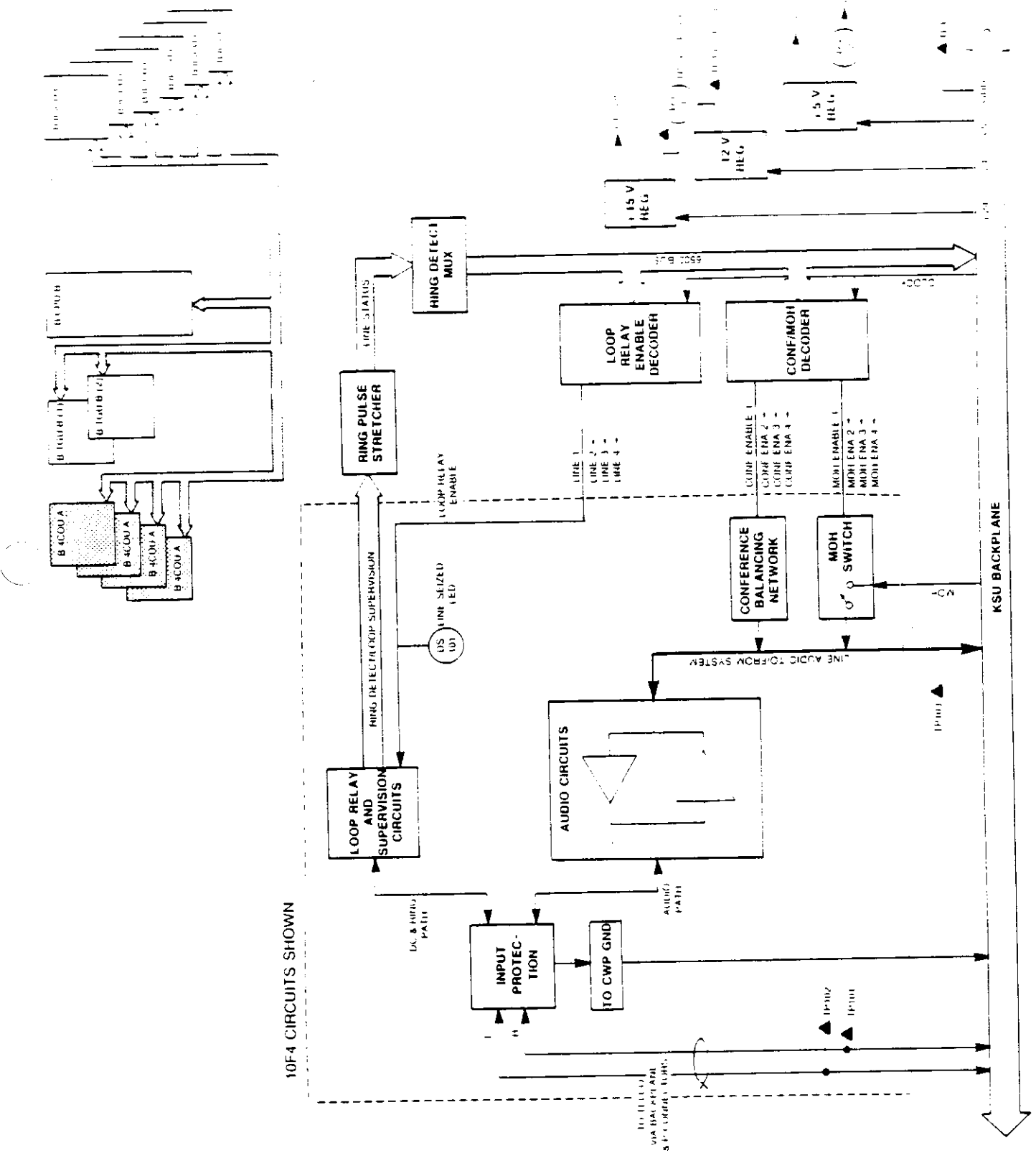
3.59 Music on Hold, if provided by an external music source, is sent to a line on Hold by the MOH Switch. The MOH switch is controlled by Conference/MOH Decoder, which is in turn controlled by the 6502 Data Bus commands.

On-Board DC Regulation

3.60 On-board circuits post regulate the -24 V, -24 V and $+5$ V lines from the KSU backplane. The $+24$ V is connected to the $+15$ V Regulator, which outputs $+15$ VA and $+15$ V (TP2). The -24 V is input to the -12 V regulator. This circuit generates -12 V (TP3). The $+15$ V and -12 V potentials illuminate LED DS1. The $+5$ V regulator accepts $+5$ V from the backplane and outputs $+5$ VA and $+5$ (DS2).

Summary

3.61 The B-4COU-A PCB contains the circuitry to connect four CO or PBX lines to the system. It provides for Hold, ring detection, DC loop supervision, Dial Pulsing, multiline Conference and Music on Hold. It also contains a balanced differential amplifier to receive and transmit voice band signals.



10F4 CIRCUITS SHOWN

Figure 8-13 B-4COU-A CENTRAL OFFICE UNIT PCB BLOCK DIAGRAM, EK-824/1232/1648

4. TELEPHONES

MULTIBUTTON KEY TELEPHONE

4.01 The Multibutton Key Telephone (Figure 8-14) is the most sophisticated station instrument in the system. It contains an internal microprocessor (with memory) that communicates with the 6504 microprocessor in the B-8SCU-C PCB. This provides for real time response to call activity. The telephone microprocessor also manages the keyboard, dialer, and display (optional), as well as the analog handset/speakerphone switching. The telephone is connected over four conductor cable to a dedicated port on its assigned B-8SCU-C PCB in the KSU.

Data and Power

4.02 Control data is simplex over the DC voltages in the station A pair wires. The green wire carries -24 V; the red wire carries +24 V. The Voltage Network uses these two potentials to generate -12.4 V, -6.8 V, a ground reference, +7.5 V and +15 V for telephone circuit power. Receive data (voltage) from the KSU is detected in the Receive Data (RX) circuits and input into the telephone microprocessor (TP202). Transmit data (current) from the telephone microprocessor (TP203) is current amplified in the Transmit Data (TX) circuits and sent to the KSU.

Watchdog Timer and Processor Clock

4.03 The watchdog timer continually monitors the receive data port and one of the data output ports on the telephone microprocessor. As long as data from both sources continues, the timer is refreshed. If either source should fail (i.e., if either the 6504 or the telephone microprocessor stops functioning), the watchdog times out and the processor is reset.

4.04 The internal operations of the microprocessor in the display telephone are synchronized by a 4MHz crystal. The microprocessor in the non-display telephone runs off a solid state oscillator. Synchronization between the telephone microprocessor and the 6504 station processor is assured by the frame sync pulse that precedes each data exchange.

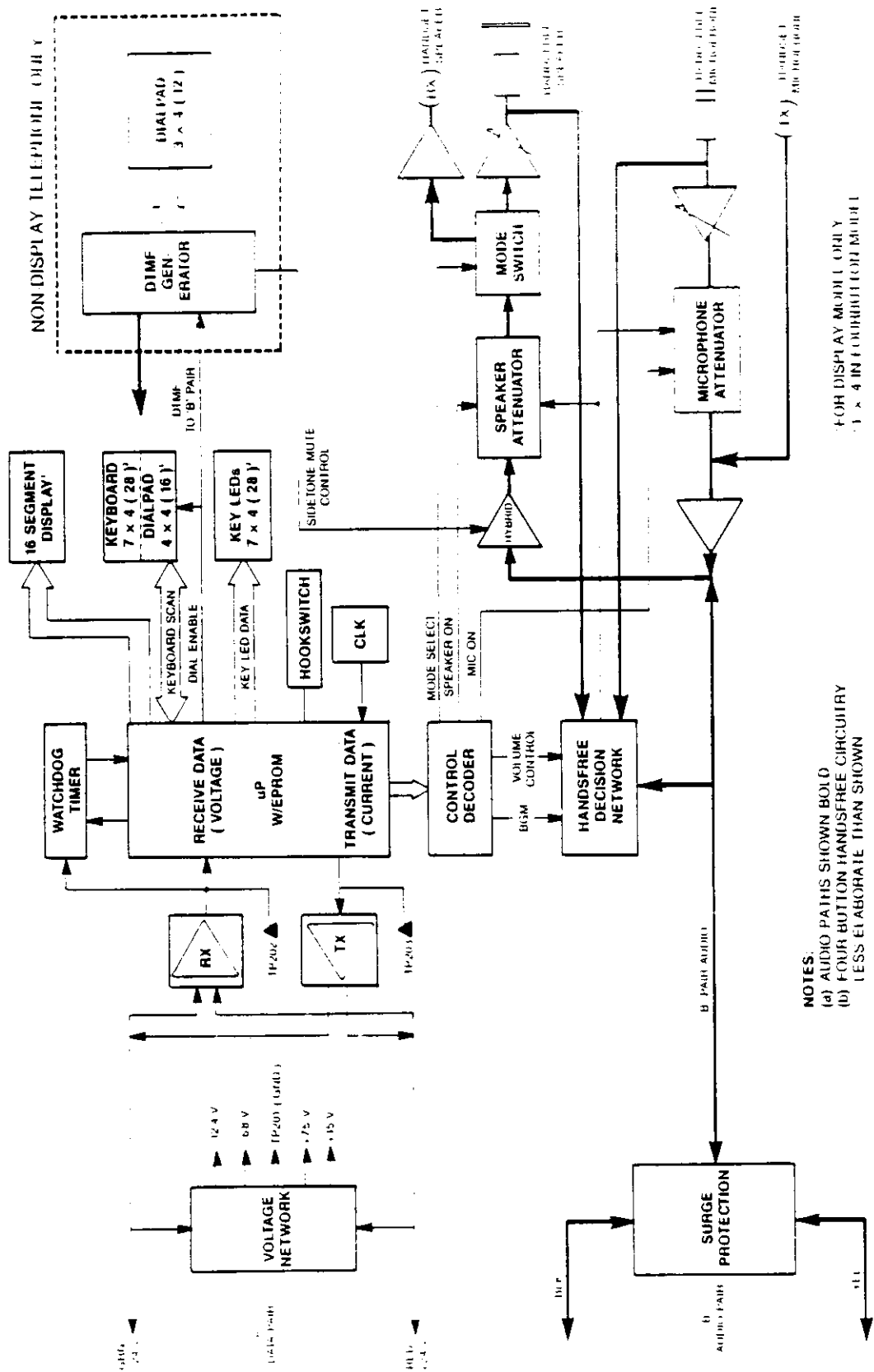
Keyboard, Dial Pad, and Display Functions

4.05 The telephone microprocessor continually scans the 28 button keyboard for a key depression. When a key depression is sensed, the bit that corresponds to the key in the transmit data stream is set. This set bit is detected and acted on by the 6504 station processor in the B-8SCU-C PCB. If appropriate, the 6504 returns a command in the receive data stream that causes the telephone microprocessor to light the LED under the key.

4.06 The dial pad in the display telephone is scanned as if it were an additional 16 button key matrix. Key depressions are included in the data stream transmitted to the KSU. The dial pad in the non-display is treated differently since it contains an internal DTMF generator. This type of dial pad sends out the actual DTMF tone cluster (that corresponds to the key depression) on the telephone audio (B) wire pair. The non-display telephone dialer attaches a DTMF receiver in the KSU; the display telephone dialer does not. Either type of dial pad can be shut down by the dial enable interrupt from the microprocessor. This typically occurs during Toll Restriction or if too many digits are dialed.

4.07 The telephone microprocessor also scans the optical hookswitch for handset position. Hookswitch status is included in the data sent to the KSU.

4.08 The 16 segment fluorescent display in the display telephone is also controlled by the telephone microprocessor. The processor sends control data to display decoders and drivers. The display messages are initially formed in the 6502 traffic control processor in the B-CPU-B PCB.



NOTES:
 (a) AUDIO PATHS SHOWN BOLD
 (b) FOUR BUTTON HANDSFREE CIRCUITRY
 LESS ELABORATE THAN SHOWN

FOR DISPLAY MODEL ONLY
 1 X 4 IN FOUR BUTTON MODEL

Figure 8-14 MULTIBUTTON KEY TELEPHONE BLOCK DIAGRAM, EK-824/1232/1648

Audio Section

4.09 Audio is connected to the telephone over the B pair (black and yellow wires). A Surge Protection network is connected across the B pair to keep high voltage transients away from the audio components. Incoming audio is sampled by the Handsfree Decision Network and fed to the hybrid amplifier (which eliminates excessive Handsfree sidetone). The signal is then connected to the speaker attenuator, the mode switch (handset or Handsfree), and to either the handset receiver or to the speaker. Audio from the telephone originates at either the Handsfree microphone, which is passed through an additional Microphone Attenuator stage, or the handset microphone. The signal is then amplified, sampled by the Handsfree Decision Network and sent out on the B pair.

Control Decoder

4.10 The Control Decoder allows digital outputs from the microprocessor to determine the mode of the telephone analog section. This decoder has discrete outputs for Mode Select (handset or Handsfree), Speaker (on or off), Microphone (on or off) and Background Music (on or off). The BGM signal from the Control Decoder is used to put the speakerphone in a high impedance mode. This mode is required when many speakerphones are connected to the same common signal, such as occurs when Background Music is on or a call is ringing in. The Control Decoder also drives a step decoder which provides varying voltage levels for the speakerphone volume control.

The Handsfree Decision Network

4.11 The telephone operates in three basic modes: transmit, receive and idle. Transmit can be either with the handset or Handsfree (using the microphone). Receive can also be with the handset or Handsfree (using the speaker). When the telephone is neither transmitting nor receiving, it is in the idle mode. The idle mode can automatically dampen background noise if the telephone is in an environment where that noise is at a consistent level (such as from a fan, etc.).

4.12 The operation of the Handsfree speakerphone (speaker and microphone) is determined by a combination of signals from the Control Decoder, the B pair audio, the microphone and the speaker. As shown in the bottom half of Figure 8-14, the microphone and speaker signals loop back to the Handsfree Decision Network. This network compares the audio levels at the speaker to levels on the microphone and the B pair to determine if the telephone is transmitting or receiving.

4.13 As a result of this comparison, control voltages are sent by the Handsfree Decision Network to the Microphone and Speaker Attenuators. These attenuators are also controlled by the Control Decoder, which receives its input directly from the station microprocessor, independent of the audio levels present. What is happening in the telephone is determined on the one hand by the type of call, and on the other hand by the relative levels of transmit and receive. For example, if a call is transferred Handsfree, the control decoder turns both the Handsfree microphone and speaker on, the handset off, and the BGM high impedance mode off. Whether the telephone is transmitting to or receiving from the calling party is determined by how loud the incoming audio is, compared against how loud the outgoing reply is.

Summary

4.14 The Multibutton Key Telephone is a microprocessor based key telephone. It is connected to the B-8SCU-C PCB by four conductor station wire: two conductors carrying power and simplex data, two conductors carrying the audio. The data exchange between the KSU and the telephone controls the telephone. The status of the audio section is also controlled by the handsfree decision network, working in conjunction with the microprocessor controller.

FOUR BUTTON KEY TELEPHONE

4.15 The Four Button Key Telephone is essentially the same telephone as the multibutton, except that:

- The Handsfree Decision and speakerphone circuitry is less elaborate than in Figure 8-14.
- All four button telephones use DTMF dialers (like the non-display multibutton telephones).
- The four button microprocessor only has to scan four keys and illuminate four key LEDs.
- Four button telephones do not have displays.

DIRECT STATION SELECTION (DSS) CONSOLE

4.16 The Direct Station Selection (DSS) Console is available in a single port—64 button version (Figure 8-15) or a dual port—56 button version (Figure 8-16). The microprocessor in the single port DSS and the two microprocessors in the dual port DSS, which communicate with the 6504 station processor in the B-8SCU-C PCB, function like the microprocessor in the multibutton telephone to scan the keys and light the key LEDs. The single port DSS Console also contains a speaker for off hook signaling.

Keyboard Scan and Data Flow

4.17 Data is simplex on the A pair wires. The green wire carries -24 V from the B-8SCU-C PCB; the red wire carries +24 V. These levels are connected to a voltage network that produces the ground reference and voltage potentials used for circuit power. Data from the KSU (voltage) is detected in the Receive Data (RX) circuits and sent to the DSS microprocessor (at TP3/TP202). Data from the DSS microprocessor to the KSU (current) is sent out (at TP2/TP203) by the Transmit Data (TX) circuits. Single port DSS console data communication (Figure 8-15) uses the A pair wires of one B-8SCU-C PCB station port. Dual port DSS console data communication uses the A pair wires from two B-8SCU-C PCB station ports.

4.18 The DSS microprocessor continually scans the DSS keys. When a key depression is sensed, the data bit corresponding to that depression is sent in the TX data to the 6504 station processor. If appropriate, the Receive Data from the KSU will instruct the DSS processor to illuminate the LED under that key.

4.19 The Watchdog Timer is refreshed by the receive data from the B-8SCU-C PCB. If that PCB should stop sending data, the watchdog times out and resets the DSS microprocessor.

4.20 The internal operation of the DSS microprocessor is synchronized by the internal clock source. Synchronization between the DSS and the B-8SCU-C PCB is ensured by the frame sync pulse transmitted from the 6504 station processor at the beginning of every data exchange.

Off Hook Signaling Speaker

4.21 The single port DSS Console B pair wires (black and yellow) carry incoming ring audible for attendant off hook signaling. The incoming ring passes through the Surge Protection Network and is sent to an audio amplifier. This amplifier drives the speaker in the console. The switching of the incoming ring is done in the KSU, not in the DSS console. The dual port DSS console does not have this capability.

SINGLE LINE (2500 TYPE) AND ONE BUTTON TELEPHONES

Single Line (2500 Type) Telephone

4.22 Standard single line (2500 type) telephones (Figure 8-17) may be connected to the system. These telephones must be equipped with special ringers and must be connected to a port on a B-8SLU-B PCB in the KSU.

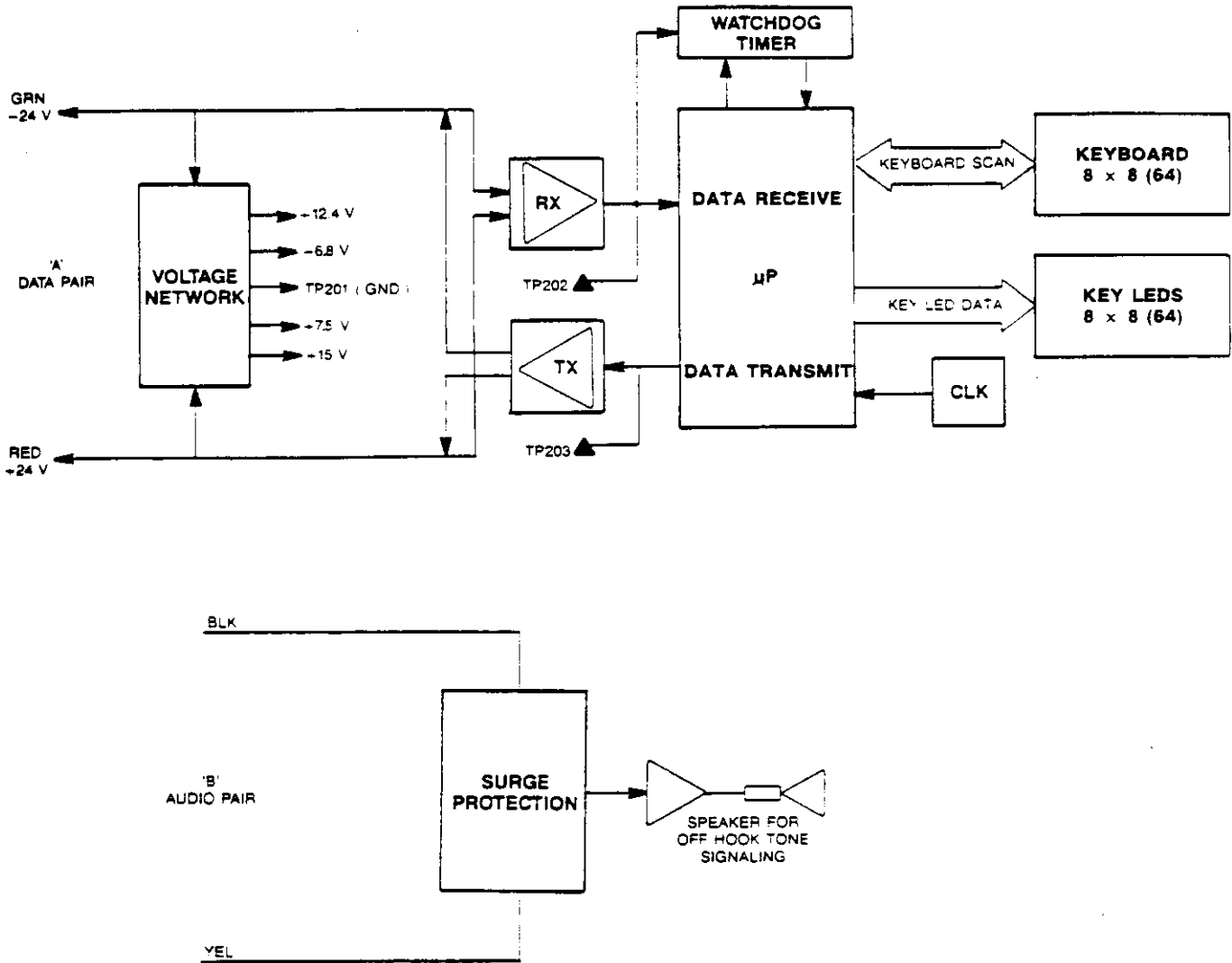


Figure 8-15 SINGLE PORT DIRECT STATION SELECTION (DSS) CONSOLE BLOCK DIAGRAM, EK-824/1232/1648

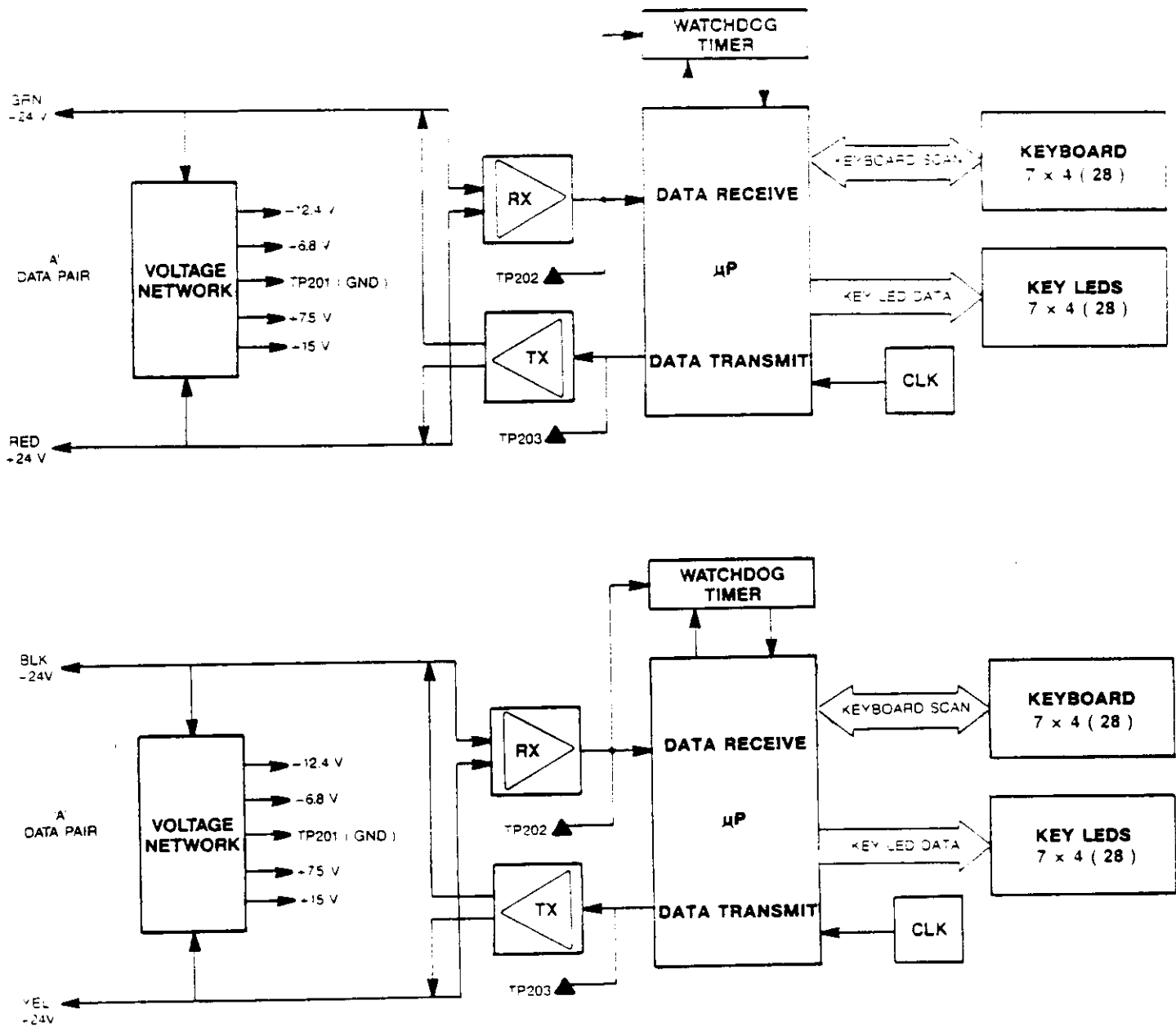


Figure 8-16 DUAL PORT DIRECT STATION SELECTION (DSS) CONSOLE BLOCK DIAGRAM, EK-824/1232/1648

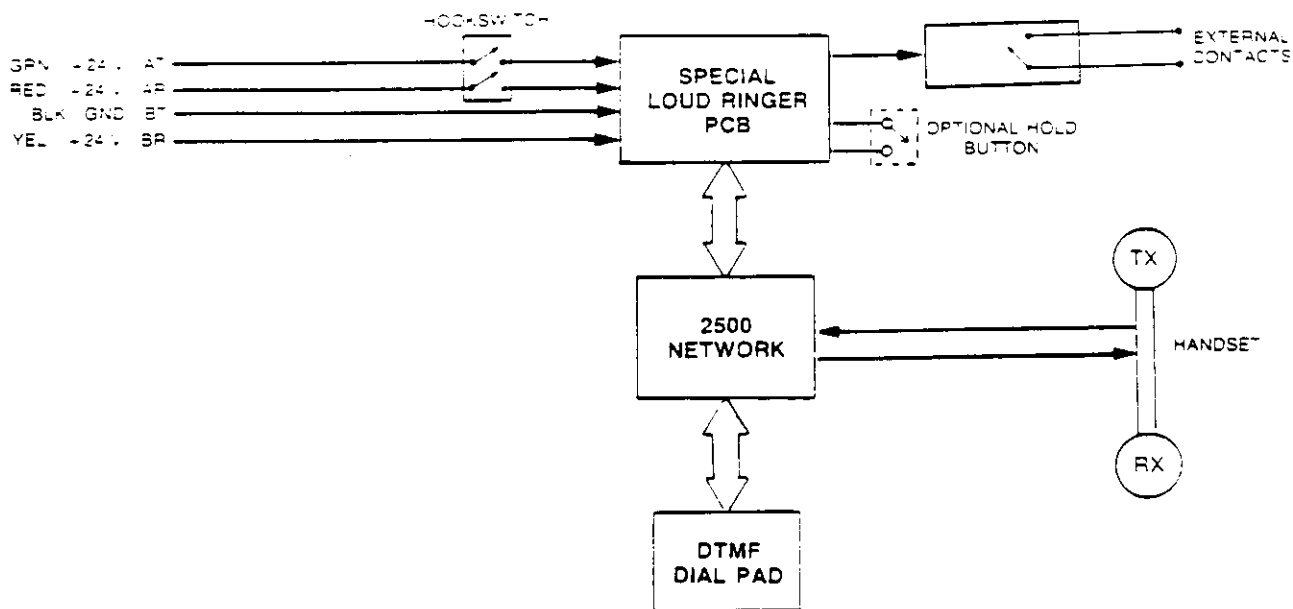


Figure 8-17 SINGLE LINE (2500 TYPE) TELEPHONE BLOCK DIAGRAM, EK-824/1232/1648

4.23 The single line telephone green and red wires (A pair tip and ring) carry the 48 V DC required to power the telephone. The green wire carries +24 V; the red wire carries -24 V. Audio from the B-8SLU-B PCB is also on the A pair.

4.24 The hookswitch, 2500 network, DTMF dial pad and the telephone handset function as they do in a standard single line circuit. The only difference is the method by which incoming ring is detected. To make the telephone ring, the B-8SLU-B PCB grounds the green (+24 V) wire. The Special Loud Ringer detects this as a ring enable interrupt and turns on its ringer. When the call is answered, the B-8SLU-B responds by releasing the ground on the -24 V line, and ringing stops. An optional Hold button may be connected to the Special Loud Ringer, if desired. Pressing the Hold button interrupts the A pair loop current to simulate the "hookflash" operation required to put calls on Hold, Transfer calls, etc. The Special Loud Ringer also contains a set of dry relay contacts that can be used to turn on external devices for loud ringing.

4.25 The station B pair wires provide ground and a current limited +24 V for alternate ringing schemes.

One Button Single Line Telephone

4.26 The One Button Single Line Telephone functions the same as the single line (2500) set, except that it requires less A pair loop current. The adjustment for this is made in the current mode strap on the B-8SLU-B PCB.

5. ANALYSIS OF SIGNAL FLOW

RECEIVING AN OUTSIDE CALL

Detecting the Incoming Call

5.01 An incoming call from the Central Office or PBX will send ringing into the system. This ringing is detected in the B-4COU-A PCB to which the line is connected (Figure 8-18, signal 1). As the B-CPU-B polls the B-4COU-A PCBs, it sees the ring detect, processes it, and sends a flashing LED to all the multibutton stations in the system (Figure 8-18, signal 2).

5.02 The B-CPU-B PCB has the responsibility of sending audible ringing into the station B pairs. The tone used for CO audible is generated on the B-TGU-B PCB, and connected to an on-board DTMF Tone Matrix. The ZSU executive, through the Matrix Control, tells the DTMF Tone Matrix to connect CO audible to an intercom link (Figure 8-18, signal 3). The B-8SCU-C PCB connects the station B pair to the ringing link. The ZSU also controls the timing (on/off) of the CO audible tone bursts. As long as the multibutton station is idle, ringing will be broadcast from the speaker.

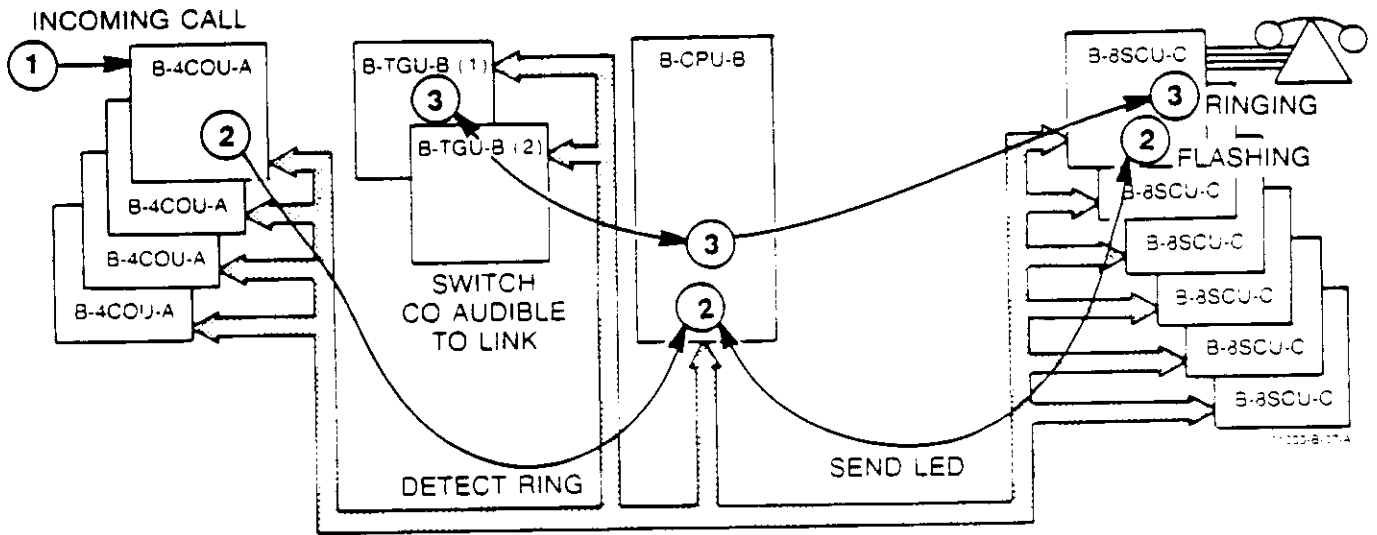


Figure 8-18 RECEIVING AN OUTSIDE CALL. EK-824/1232/1648 (Page 1 of 2)

5.03 On a four button telephone, ringing will occur in the telephone speaker unless another call is already ringing in. Only the first incoming call will ring. On a single line telephone, the B-3SLU-B PCB will enable the telephone ringer, provided another call was not previously ringing.

5.05 The audio output from the B-4COU-A PCB is connected directly to the station B pair through a single crosspoint closure in the B-3SCU-C PCB (Figure 8-18, signal 5).

Answering the Incoming Call

5.04 To answer the incoming call, the multibutton telephone user presses the flashing line key. The 6504 station processor in the B-8SCU-C PCB picks up this key depression within 100mS, and begins processing the request (Figure 8-18, signal 4). The line key will change to steadily illuminated.

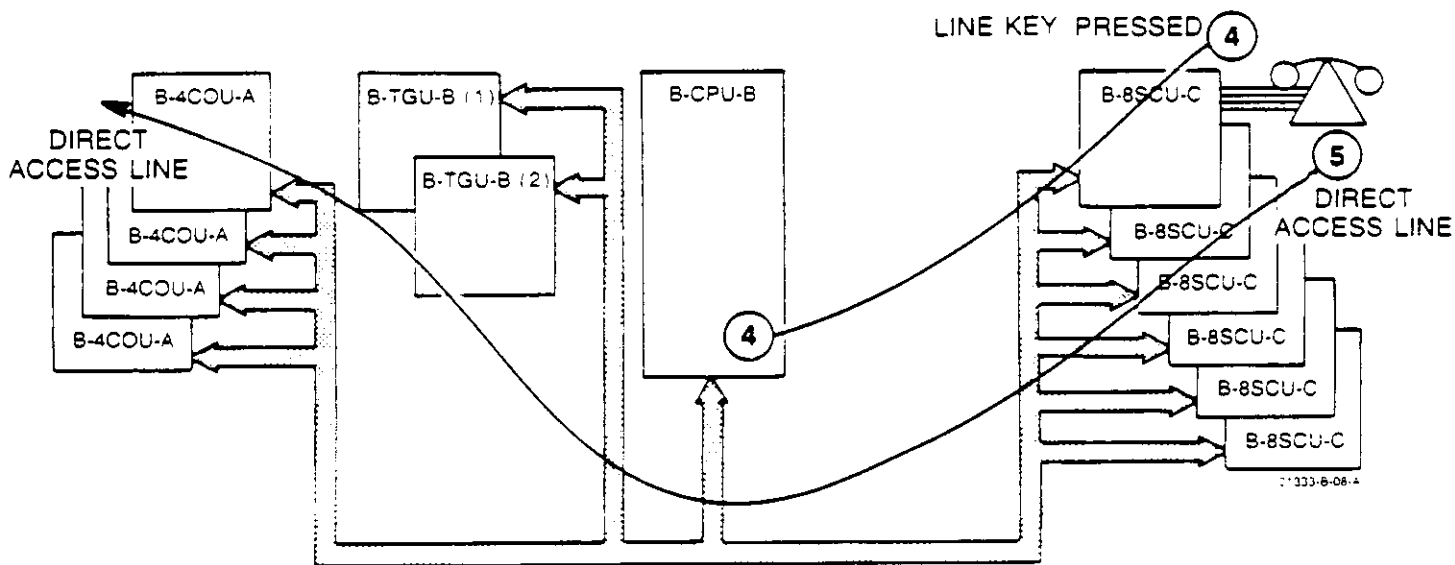


Figure 8-18 RECEIVING AN OUTSIDE CALL. EK-824/1232/1648 (Page 2 of 2)

5.06 The B-CPU-B PCB sends a Loop Relay Enable signal to the line circuit on which the call rang in. When the loop relay is seized, a DC current path is established between the front end of the line circuit and the Central Office or PBX. This is required so the calling circuit knows the call has been answered. Both requirements for answering the call have been met: the DC path for holding the line, and the audio path for carrying the conversation.

PLACING AN OUTSIDE CALL

Seizing the Line

5.08 The 6504 station processor in the B-8SCU-C PCB continually scans the key telephone for change of state. When the user lifts the handset and presses a line key, the change is sent in the data stream to the 6504, to the 6502 traffic controller in the B-CPU-B PCB, and to the Z80 for the processing decision (Figure 8-19, signal 1). The Z80 assigns a talkpath for the call and sends a Loop Relay Enable command to the line circuit being used to seize the line. If the call is being made on a Dial Pulse line, the Z80 attaches a tone generator to the talkpath to give dial tone to the party placing the call (Figure 8-19, signal 2). If the call is being placed on a DTMF line, dial tone is returned from the outside line. The data transmitted to the telephone lights the LED under the line key that was pressed.

Summary

5.07 To summarize how an incoming call is processed:

- (1) The incoming ring is detected in the B-4COU-A PCB.
- (2) Flashing LED and audible ring are sent to designated stations.
- (3) Answering party presses flashing line key.
- (4) Audio link between station and line is established.
- (5) Loop relay is seized and DC loop current flows.

5.09 The audio connection is from the telephone, through a crosspoint on the B-8SCU-C PCB, to the Direct Access Line path in the KSU backplane, and finally to the audio circuit on the appropriate B-4COU-A PCB (Figure 8-19, signal 3).

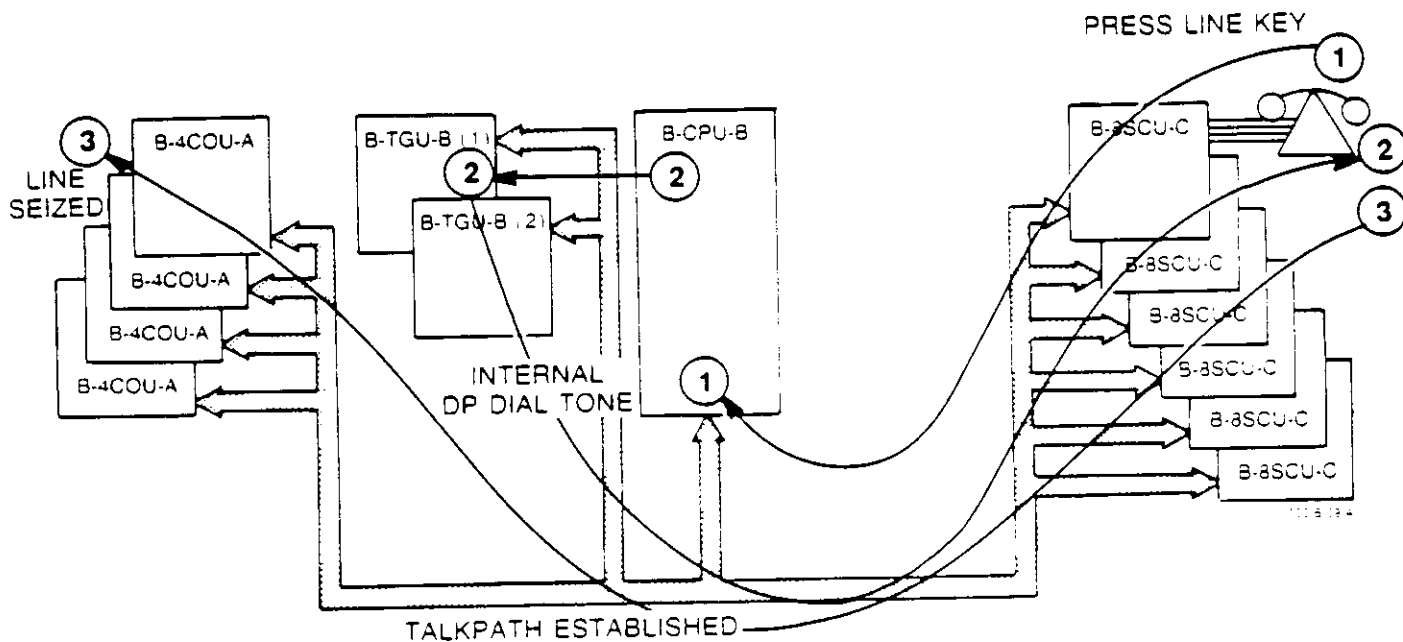


Figure 8-19 PLACING AN OUTSIDE CALL, EK-824/1232/1648 (Page 1 of 2)

Dialing

5.10 Once the user hears dial tone, dialing can begin. If the call is being made from a display telephone into a DTMF line, dial pad key depressions (dialed digits) are inserted into the data stream to the 6504 station processor. The B-CPU-B PCB pulls the dial pad data out of the data stream and sends it to the time-shared DTMF generator that it has attached to the call talkpath (Figure 8-19, signal 4). The DTMF generator sends the tones out to the line, and mirrors the tone bursts back to the telephone for dial confirmation. If the call is being placed into a Dial Pulse line, the B-CPU-B PCB receives the dial pad digits and pulses the line loop relay accordingly. In either case, Toll Restriction checks are made as the digits are dialed.

5.11 If the call is being placed from a non-display or four button telephone, the dial pad digits are not part of the A pair data stream. These telephones use dialers with integral DTMF generators, and place DTMF tone bursts onto the audio (B) pair (Figure 8-19, signal 5). These DTMF digits go out on tip and ring of the seized line. The Z80 attaches a DTMF receiver (on the B-TGU-B PCB) to the call talkpath to interpret the digits. This is done so that Toll Restriction checks and SMDR records can be made. The DTMF receiver is attached until dialing is completed. If the call is being placed on a Dial Pulse line, the DTMF receiver encodes the dialed digits for the Z80, which then tells the 6502 traffic controller to pulse the loop relay.

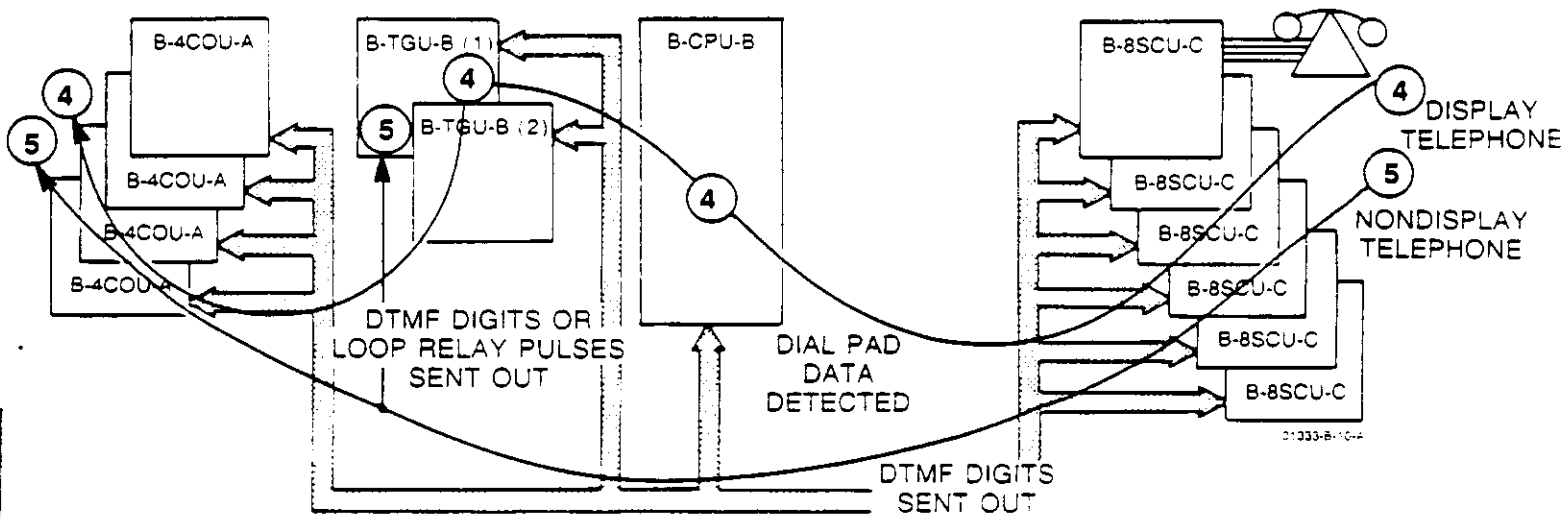


Figure 8-19 PLACING AN OUTSIDE CALL. EK-824/1232/1648 / Page 2 of 2

5.12 Four button telephones must dial codes to access outside lines. An Intercom link is connected as soon as the user lifts the handset. Once the access code is dialed over the link, the call is placed as it is for a non-display multibutton telephone. Single line (2500 type) and one button telephones also must use access codes; however, there is no data flow between the telephone and the KSU.

5.13 Since the front end of the B-4COU-A PCB is not current sensitive, answer detection is not required.

Summary

5.14 To summarize how an outgoing call is placed:

- (1) Request for line is processed by B-CPU-B PCB.
- (2) Line seized and talkpath established.
- (3) Dialed digits sent out by B-TGU-B PCB (display telephone) or on-board DTMF generator in dialer (non-display telephone).
- (4) Dialed digits checked for Toll Restriction and SMDR.

PLACING AN INTERCOM CALL

Initiating the Call

5.15 When the multibutton telephone user lifts the handset and presses the INT key, the change of state is sent in the data stream to the 6504 station processor. The 6502 traffic controller in the B-CPU-B PCB sees the change and sends it to the Z80 for processing (Figure 8-20, signal 1). The Z80 in the B-CPU-B PCB interprets the change and assigns an Intercom link to the station. It signals the B-TGU-B PCB to put Intercom dial tone on the selected link, and instructs the B-3SCU-C PCB to connect the link to the telephone audio (B) pair (Figure 8-20, signal 2). The system waits for digits to be dialed.

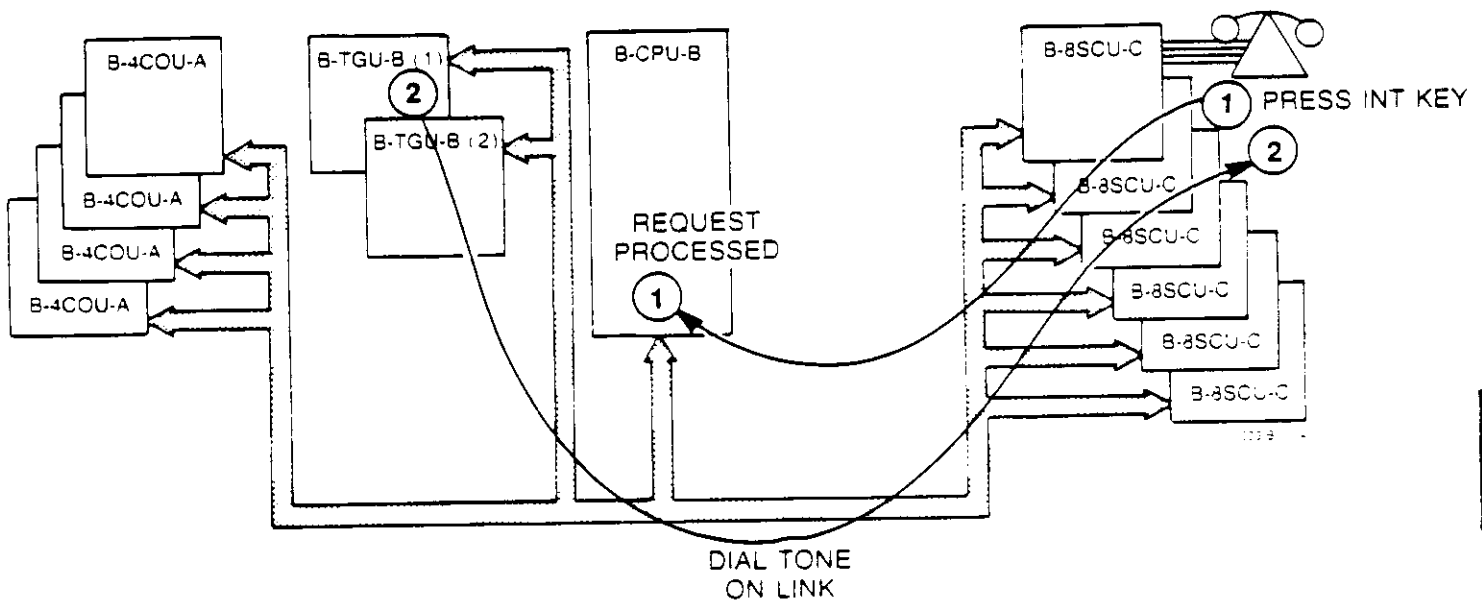


Figure 8-20 PLACING AN INTERCOM CALL, EK-824/1232/1648 (Page 1 of 2)

Dialing the Intercom Call

5.16 Once Intercom dial tone is returned to the calling station, the user can dial the destination station (Figure 8-20, signal 3). If a display telephone is being used to place the call, the dial pad digits are included in the data exchange from the telephone to the B-8SCU-C PCB. The 6504 station processor reads the dialed digits and sends them to the B-CPU-B PCB. If the called extension is busy, the Z80 tells the B-TGU-B PCB to attach busy tone to the calling link. If the called station is idle (and Handsfree Answerback is enabled), the Z80 connects the B pair of the called station to the Intercom link and enables the called station's speakerphone (Figure 8-20, signal 4). The Z80 instructs the B-TGU-B PCB to send splash tones to the called station, indicating that an Intercom conversation has been established (Figure 8-20, signal 5).

5.17 If a non-display telephone is being used to place the call, the dial pad key closures are encoded into DTMF tone bursts in the telephone. These DTMF tones are sent down the station B pair (on the seized Intercom link) to the B-TGU-B PCB, where they must be decoded in a DTMF receiver. The Z80 looks at the output of the DTMF receiver to determine which station was called. All other functions are identical to the display telephone.

5.18 If Forced Intercom Ringing is enabled, the Z80 will command the B-TGU-B PCB to ring the called station. The Intercom link is connected between the two stations only when the called party lifts the handset.

5.19 Four button, single line (2500 type) and one button telephones are automatically connected to an Intercom link when the handset is lifted. Except for this difference, an Intercom call is processed exactly as it is for a non-display multibutton telephone.

Summary

5.20 To summarize how an Intercom call is placed:

- (1) When the B-CPU-B PCB detects that the INT key has been pressed, an Intercom link is seized.
- (2) Intercom dial tone is returned to calling station.
- (3) Dialed digits are sent to the KSU.
- (4) Intercom link connected to called party.

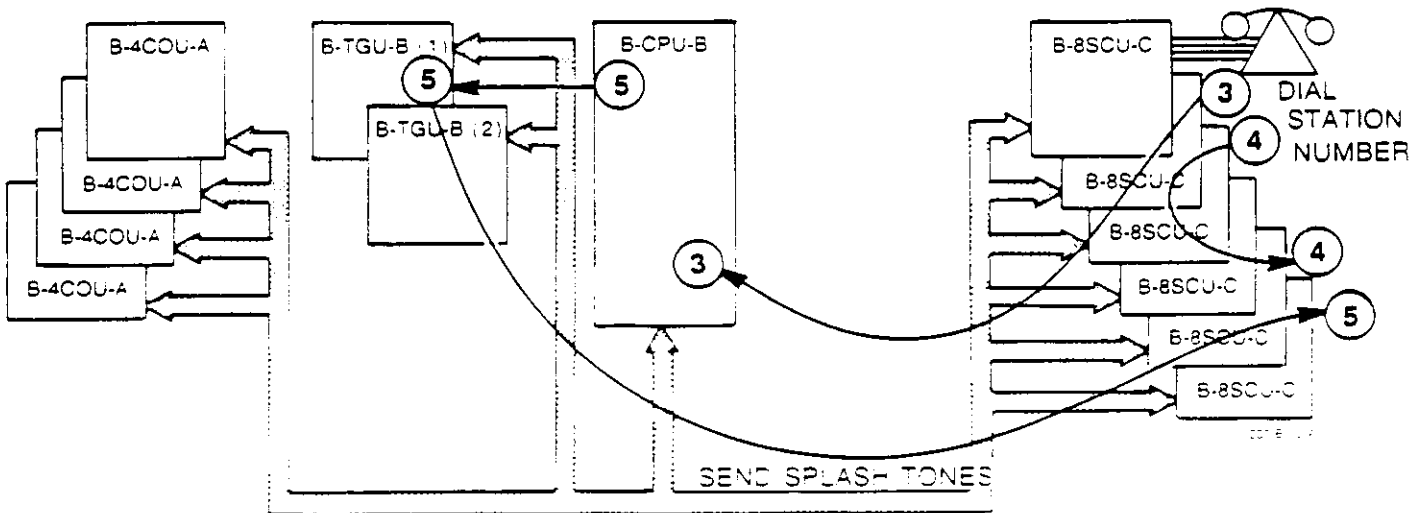


Figure 8-20 PLACING AN INTERCOM CALL. EK-824, 1232, 1648 (Page 2 of 2)

EK-824/1232/164S
ELECTRONIC KEY TELEPHONE SYSTEM
SECTION 9, MAINTENANCE

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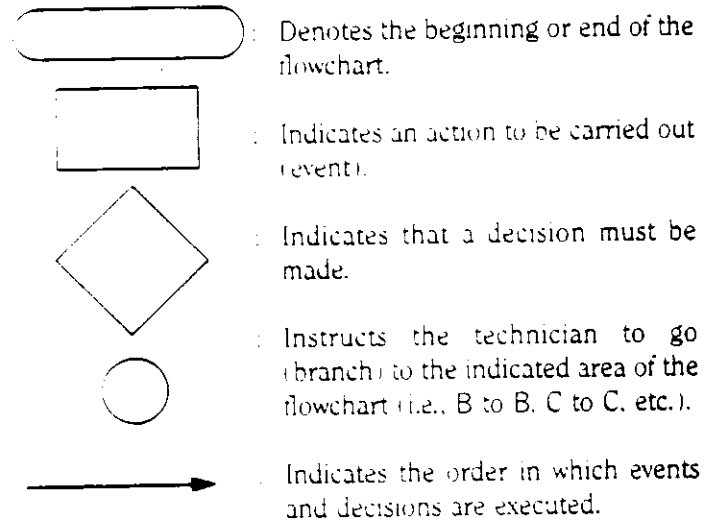
1. INTRODUCTION

1.01 The MAINTENANCE Section, intended to be used in conjunction with the THEORY OF OPERATION (Section 8), allows service personnel to isolate and repair system troubles to the module (plug-replaceable unit) level. This section uses the System Troubleshooting Flowchart (Figure 9-1) to guide the technician in efficient and systematic testing and fault location. The flowchart is supported by the Operational Test Procedure (Table 9-1), System Voltages (Table 9-2), the Replaceable Parts List (Table 9-3), and the illustrations on the various LEDs and Testpoints (Figures 9-2 and 9-3).

1.02 Operational Specifications for each telephone are included in Appendixes A through E of this manual. These specifications provide instructions on how to access each feature.

2. TROUBLESHOOTING FLOWCHARTS

2.01 The System Troubleshooting Flowchart (Figure 9-1) provides service personnel with a logical framework for system checking and fault isolation. The flowchart is divided into five parts: System Check (Page 1 of 5), LED Check (Page 2 of 5), Voltage Check (Page 3 of 5), Power Supply Check (Page 4 of 5), and Features and Programming Check (Page 5 of 5). The System Check provides the outline for a correct installation, as well as a sequence for fault isolation and repair. The LED, Voltage and Power Supply Checks allow the basic parameters of the system to be verified. The Features and Programming Check shows the interrelationship between feature operation and system programming.



CAUTION: THE PRINTED CIRCUIT BOARDS USED IN THE SYSTEM CONTAIN STATIC SENSITIVE CMOS COMPONENTS. AN ANTI-STATIC GROUND WRIST STRAP, TERMINATED AT EARTH GROUND, MUST BE WORN IF PCBS ARE TO BE HANDLED. PCBS MUST BE STORED IN THEIR VELOSTAT BAGS WHEN NOT PLUGGED INTO THE KSU.

CAUTION: A THERMAL PROTECTION DEVICE IS LOCATED ON THE KSU. IN SYSTEMS USING A B-PSU-A POWER SUPPLY, THIS DEVICE WILL AUTOMATICALLY SHUT DOWN ALL POWER SUPPLY OUTPUTS (VIA POWER SUPPLY CONNECTOR PIN 3) WHEN THE MAXIMUM OPERATING TEMPERATURE FOR THE SYSTEM IS EXCEEDED. WHEN THIS TEMPERATURE IS EXCEEDED IN SYSTEMS USING THE B-PSU-B OR B-PSU-E POWER SUPPLY, THE THERMAL PROTECTION DEVICE CAUSES THE RESET BUTTON ON THE FRONT FACE OF THE POWER SUPPLY TO POP UP, REVEALING A WHITE BAND. THIS BAND INDICATES THAT THE SYSTEM IS OPERATING AT DANGEROUSLY HIGH TEMPERATURES. THE THERMAL PROTECTION DEVICE WILL NOT SHUT DOWN THE POWER ON THE B-PSU-B OR B-PSU-E POWER SUPPLY.

3. OPERATIONAL TEST PROCEDURE

3.01 The Operational Test Procedure (Table 9-1) provides a checklist for evaluating the system features. The features are divided into three groups: Internal, External, and Optional. The table presents the features in the order they should be checked. The AVAILABLE column indicates the telephones that access the feature. The VERIFIED column is used to provide a checklist for feature status based

on the Operational Specification. The PROGRAMMABLE column indicates if the feature is affected by system programming. If a feature does not operate correctly, the SYMPTOM column is entered in the SYMPTOM column. The PROBABLE CAUSE column lists components that can cause failure. The components are presented in the order of the probability of failure.

NOTE: Since all features are accessed by the telephone, the telephone could cause any feature to fail. Before replacing a PCB, verify proper operation of the telephone at a known good station location, or at the Port 8 test location on the KSU (Figure 9-3).

4. OPERATING VOLTAGE CHECK

4.01 Operating voltages can be checked using Table 9-2.

This table permits KSU and station voltages to be measured. The voltages are identified, the acceptable range stated, and the test condition defined. The testpoint location for each voltage is explained.

4.02 The LEDs and testpoints for the system are shown in Figure 9-2. The KSU power supply fuses and test jack are shown in Figure 9-3.

4.03 Two types of handset microphones are used with the key telephones. A carbon microphone is used in multibutton key telephones with speakerphone (Handsfree). The Multibutton Display Key Telephone and the Multibutton Key Telephone without speakerphone (i.e. with Monitor) use an electret microphone that provides higher quality transmission and lower power consumption. These handsets will result in poor audio quality if they are connected to the wrong phone. The type of transmitter can be identified by looking into the holes of the handset. The carbon microphone is black and the electret microphone is silver.

5. REPLACEABLE PARTS LIST

5.01 Table 9-3 provides a replaceable parts list. Unless otherwise indicated, the items listed are available from TIE communications, Inc. Items not available from TIE communications can be purchased from local telephone equipment supply houses.

6. TOOLS AND TEST EQUIPMENT

6.01 The following tools and test equipment items are recommended:

- Standard punch down tool
- Digital (high impedance) ohmmeter
- Continuity checker
- Anti-static wrist strap
- Spare bridging clips
- Needle nose pliers
- Small diagonal pliers
- Medium size Philips-head screwdriver
- Butt set (for checking CO lines)
- Wire cutters
- Wire strippers

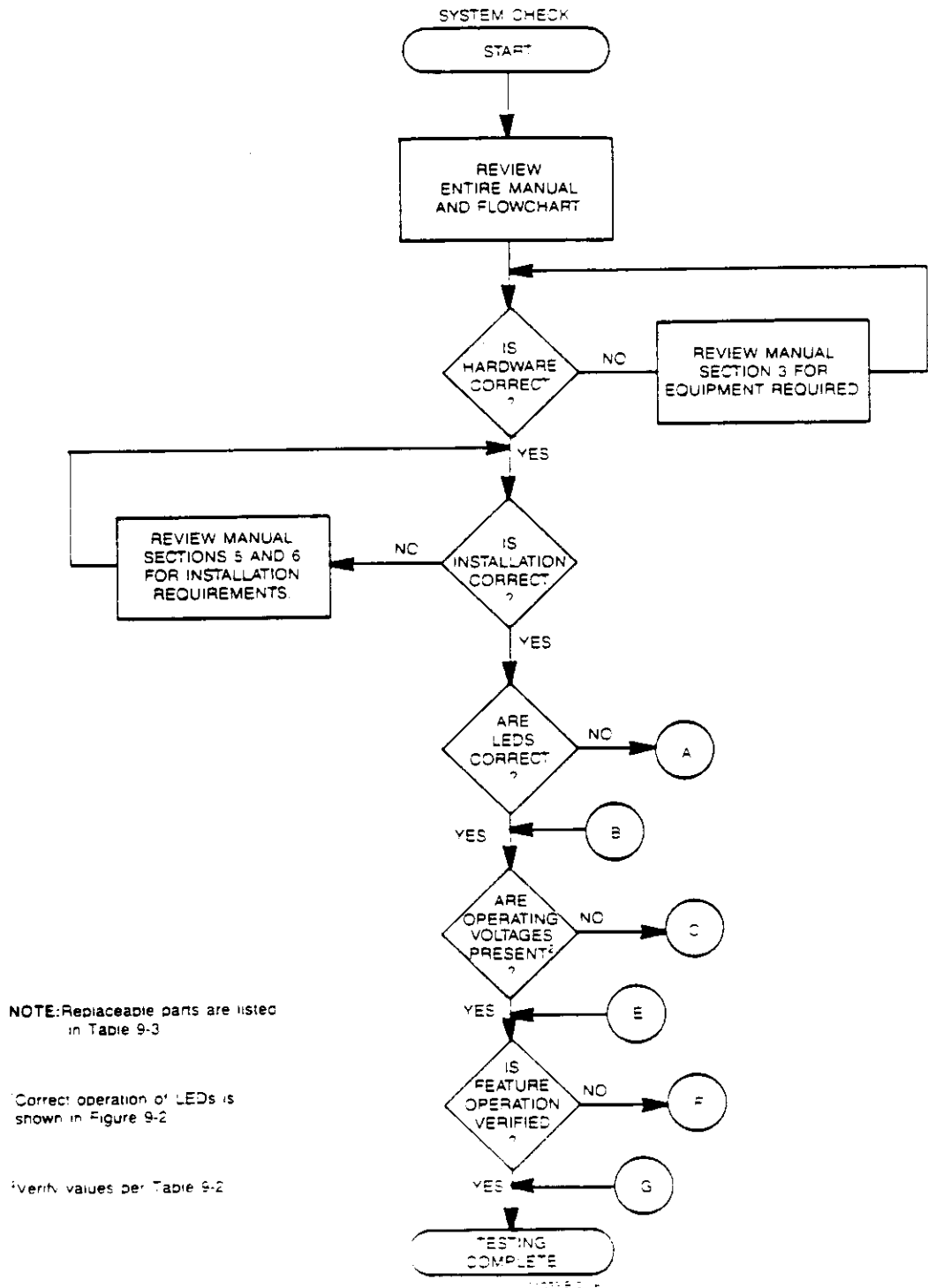


Figure 9-1 SYSTEM TROUBLESHOOTING FLOWCHART. EK-824/1232/1648 (Page 1 of 5)

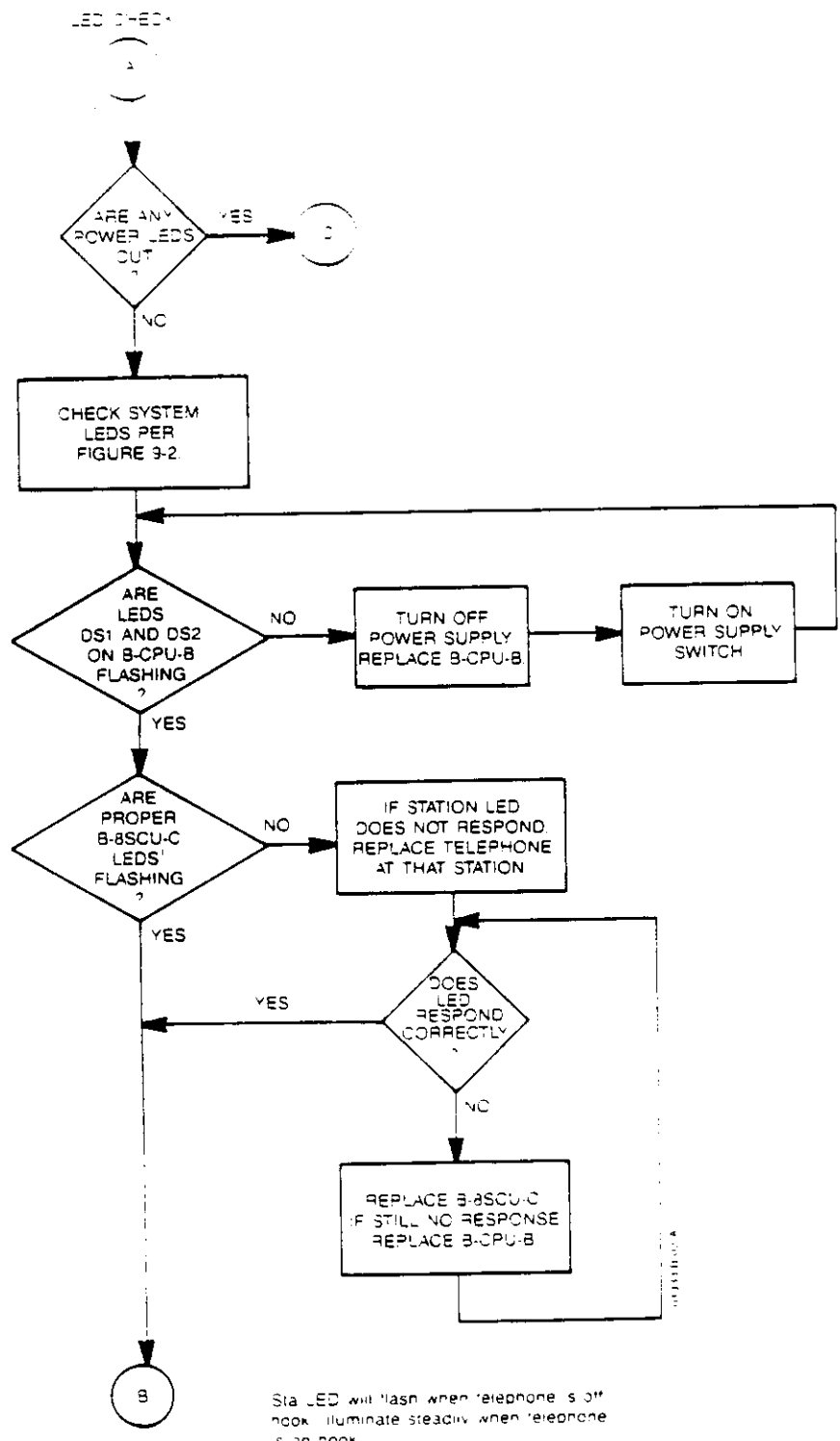
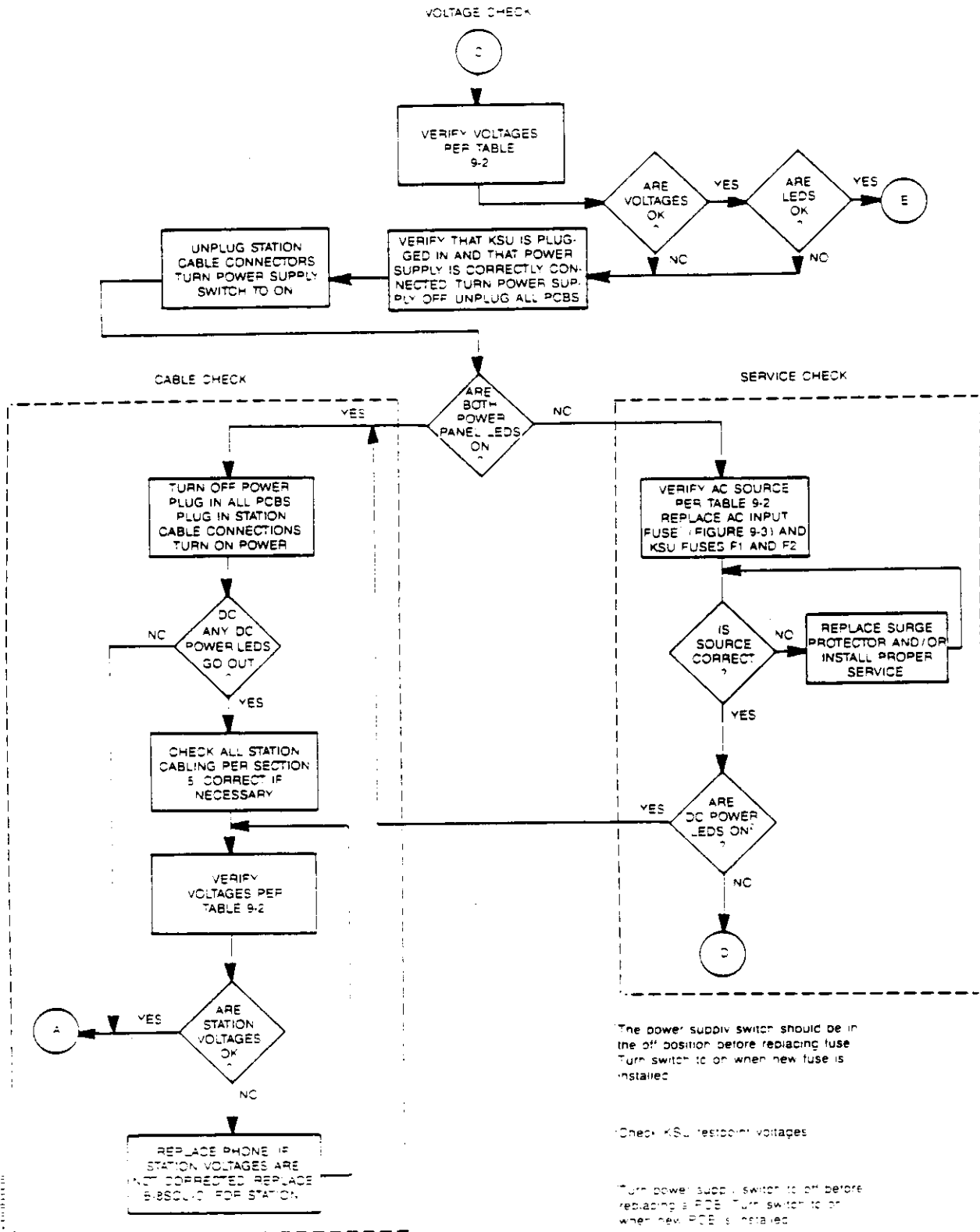


Figure 9-1 SYSTEM TROUBLESHOOTING FLOWCHART, EK-824/1232/1648 (Page 2 of 5)

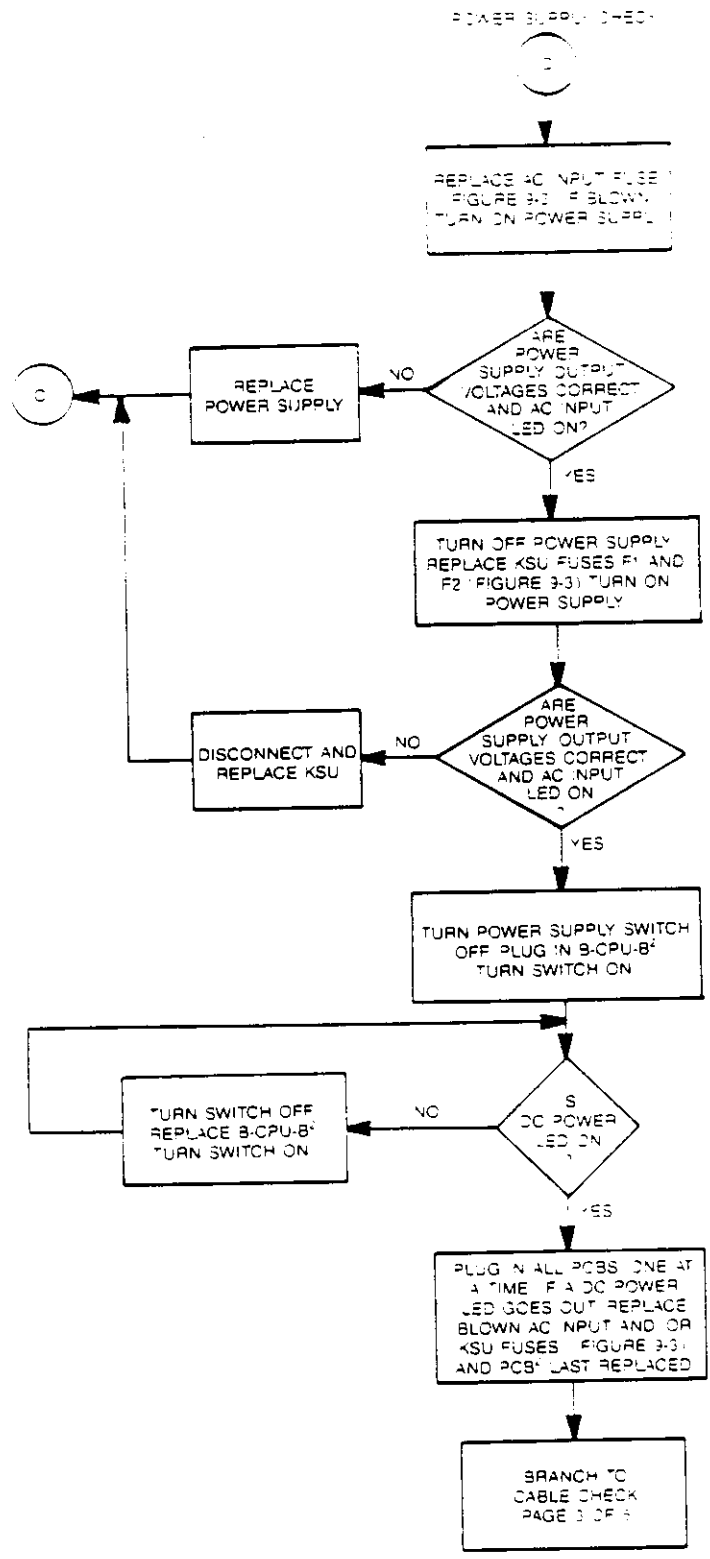


The power supply switch should be in the off position before replacing fuse. Turn switch to on when new fuse is installed.

Check KSU testpoint voltages.

Turn power supply switch to off before replacing a PCB. Turn switch to on when new PCB is installed.

Figure 9-1 SYSTEM TROUBLESHOOTING FLOWCHART, EK-824/1232/1648 (Page 3 of 5)



The power supply switch should be in the off position before replacing fuse. Turn switch to on when new fuse is installed.

Turn power supply switch to off before replacing a PCB. Turn power supply switch to on when new PCB is installed.

Figure 9-1 SYSTEM TROUBLESHOOTING FLOWCHART, EK-824/1232/1648 (Page 4 of 5)

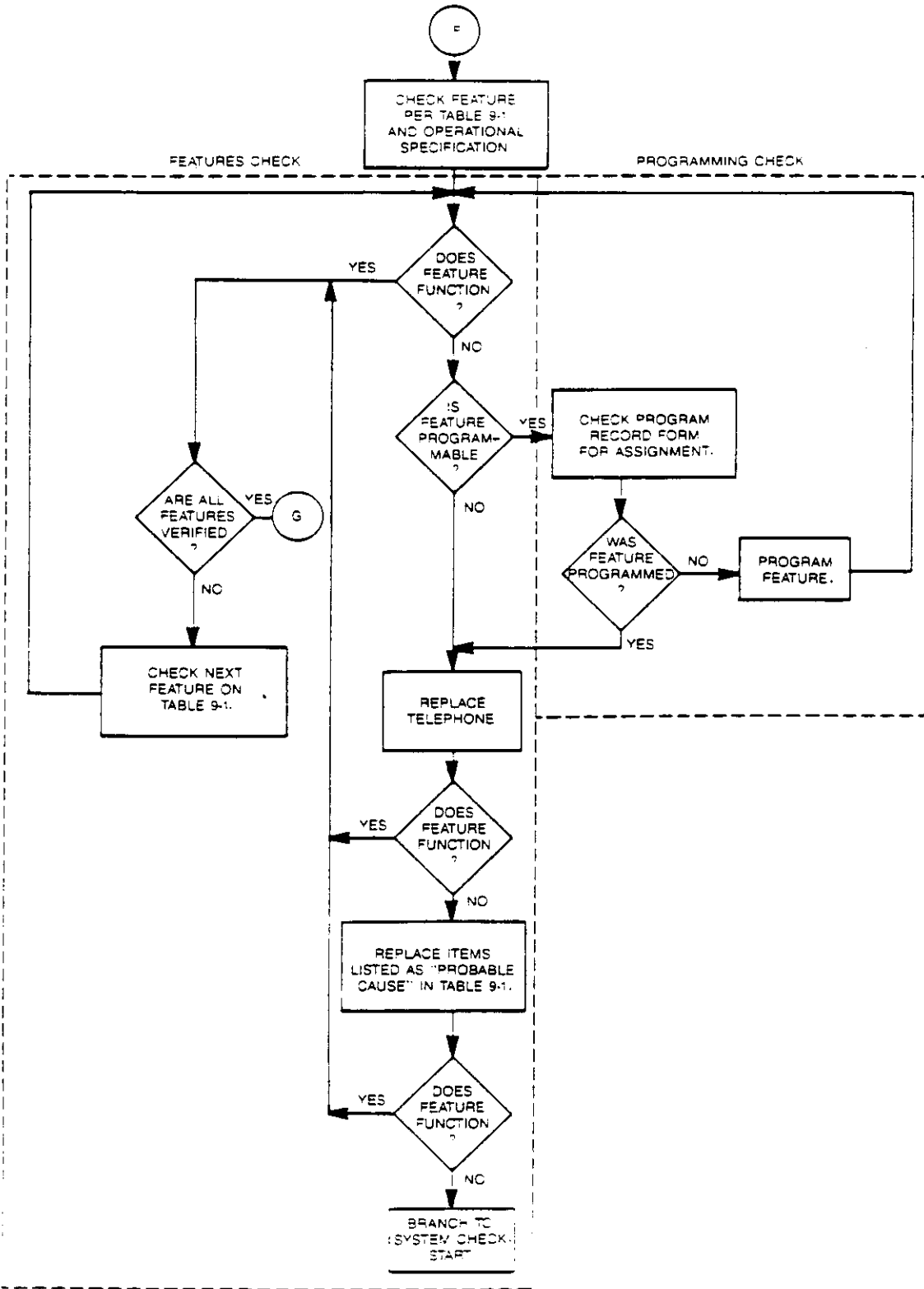
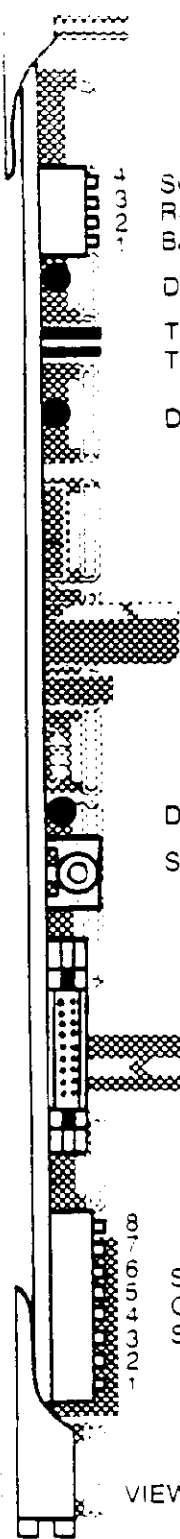


Figure 9-1 SYSTEM TROUBLESHOOTING FLOWCHART. EK-824/1232/1648 (Page 5 of 5)

CENTRAL PROCESSING UNIT (B-CPU-B) PCB



NOTE: ALL VOLTAGES ±5%

Switch S2
RS-232-C Port
Baud Rate Selection

DS3 - 5V, -12V & -12V power. Normally on (RED)

TP2 GND
TP1 +5 V DC

DS2 6502 Processor running. Normally flashing slowly (RED).

DS1 Clock (Z80 Processor Running). Normally flashing fast (RED).

S1 Reset Switch

B-CPU-B OPEN FUSE DATA*

F1 -24 V DC, 1A:

- 1. System Operational
- 2. DS3 is out
- 3. Cannot program system from CRT. Depressed CRT key causes system reset.

F2 +5 V DC, 4A:

- 1. System will be totally inoperative (i.e., constantly resetting).
- 2. BGM always ON, constant system noise.
- 3. No LEDs lit on CPU PCB.
- 4. Single line phones constantly ringing.

F3 +24 V DC, 1A:

- 1. DS1, DS3 out.
- 2. System must be reset.

Switch S3
Output Data Format
Selection

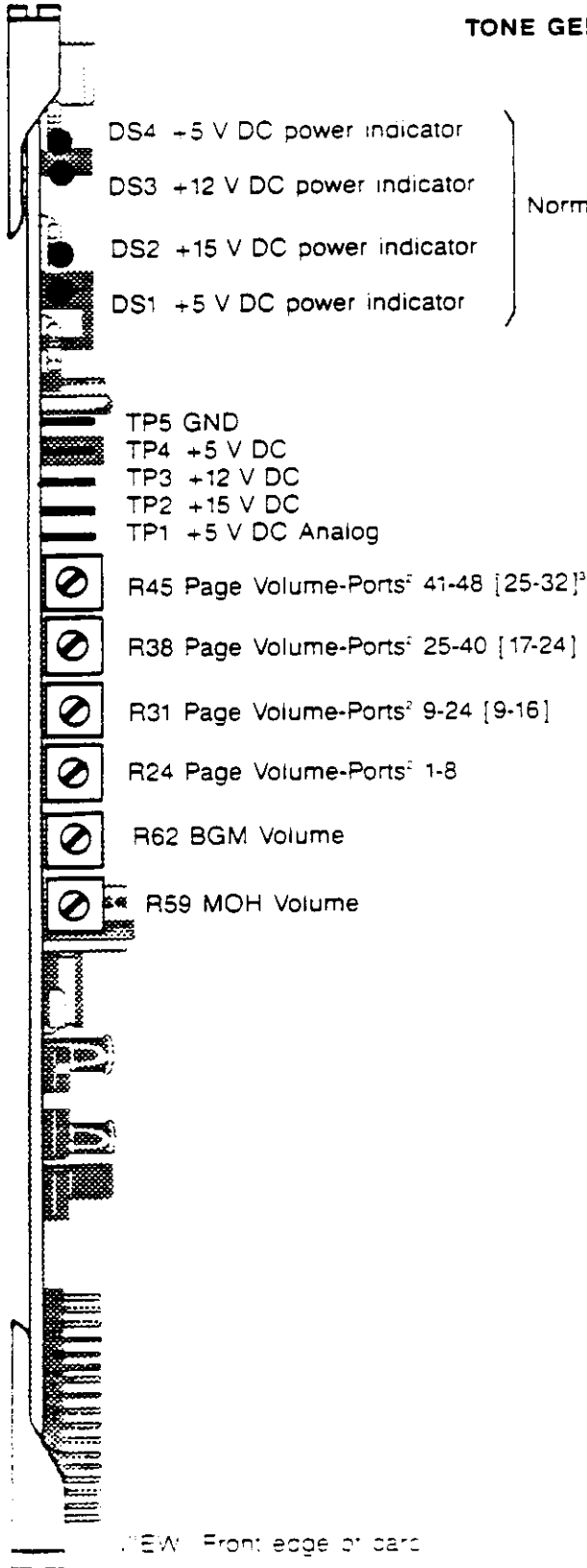
* Open fuse data is provided for troubleshooting purposes only. Do not attempt to change PCB fuses in the field.

VIEW: Front edge of card

CAUTION: Turn off power before inserting or removing B-CPU-B PCB

Figure 9-2 LEDs AND TESTPOINTS, EK-824/1232/1648 (Page 1 of 5)

TONE GENERATOR (B-TGU-B) PCB



DS4 +5 V DC power indicator
 DS3 +12 V DC power indicator
 DS2 +15 V DC power indicator
 DS1 +5 V DC power indicator

Normally ON. (GREEN)

NOTE: ALL VOLTAGES $\pm 5\%$

TP5 GND
 TP4 +5 V DC
 TP3 +12 V DC
 TP2 +15 V DC
 TP1 +5 V DC Analog

R45 Page Volume-Ports² 41-48 [25-32]³
 R38 Page Volume-Ports² 25-40 [17-24]
 R31 Page Volume-Ports² 9-24 [9-16]
 R24 Page Volume-Ports² 1-8
 R62 BGM Volume
 R59 MOH Volume

B-TGU-B OPEN FUSE DATA

- F1 +5 V DC. 1.5A:
 1. DS4 LED out on B-TGU-B PCB.
 2. CO Lines not operable (no dial tone).
 3. No dial tone for internal calls.
- F2 +24 V DC. 1.5A:
 1. DS1, DS2 and DS3 LEDs out on B-TGU-B PCB.
 2. CO Lines operational but with distortion.
 3. No dial tone for internal calls.
 4. BGM volume low.

B-TGU-B PCB STRAPPING

Tone Gen. #1 strap E1 to E2 (J13) [J8]
 Tone Gen. #2 strap E1 to E3 (J14) [J9]*

*Open fuse data is provided for troubleshooting only.
 Do not attempt to change PCB fuses in the field.

²Initialized ports.

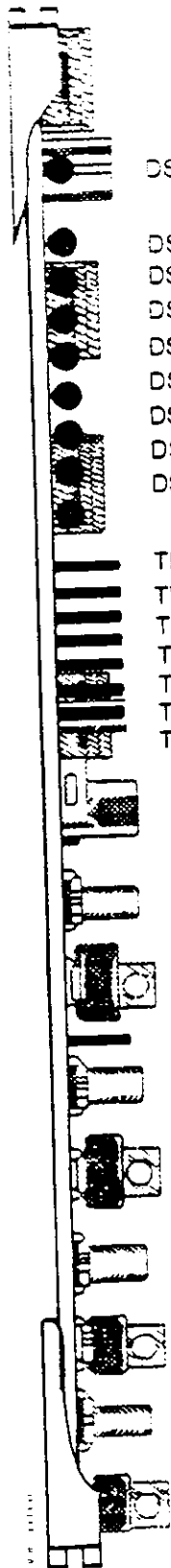
³EK-824 KSU does not provide ports 25-32.

*[J9] is not used in the EK-824 KSU.

NEW Front edge of card

Figure 9-2 LEDs AND TESTPOINTS. EK-824 1232 1648 (Page 2 of 5)

STATION (B-8SCU-C) PCB



- DS9 -5, -5 & +15 V DC power-indicator GREEN
- DS8 Station 8
- DS7 Station 7
- DS6 Station 6
- DS5 Station 5
- DS4 Station 4
- DS3 Station 3
- DS2 Station 2
- DS1 Station 1

RED

- TP7 SYNC
- TP6 +5 V DC
- TP5 +24 V DC
- TP4 -5 V DC
- TP3 +15 V DC
- TP2 -24 V DC
- TP1 GND

IF LED IS	STATION CABLE IS
OFF	- No telephone is connected
ON STEADY	- Telephone is connected and cle
FLASHING	- Station is busy

NOTE: ALL VOLTAGES $\pm 5\%$

B-8SCU-C PCB OPEN FUSE DATA*

F1 +24 V DC, 3A:

1. DS9 LED out on Station PCB.
2. Telephones connected to PCB are completely inoperative.

F2 -24 V DC, 3A:

1. All LEDs lit on key telephones.
2. All phones squeal.
3. DS9 LED out.
4. DS1-DS8 LEDs dim.

F3 +5 V DC, 3A (for digital circuit):

1. All LEDs lit on all key telephones.
2. All phones squeal.
3. DS9 LED dim.
4. DS1-DS8 LEDs out.

F4 +5 V DC, 3A (analog circuits):

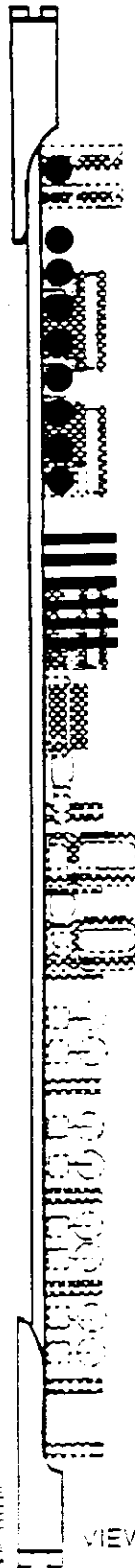
1. Telephones connected to the PCB have normal signaling on internal but no CO dial tone.

* Open fuse data is provided for troubleshooting only. Do not attempt to change PCB fuses in the field.

VIEW: Front edge of card

Figure 9-2 LEDs AND TESTPOINTS, EK-824/1232/1648 (Page 3 of 5)

SINGLE LINE (B-8SLU-B) PCB



DS9 +5, -5, & +15 V DC power-indicator NORMALLY ON (GREEN)

DS8 Station 8
 DS7 Station 7
 DS6 Station 6
 DS5 Station 5
 DS4 Station 4
 DS3 Station 3
 DS2 Station 2
 DS1 Station 1

RED

TP6 +5 V DC
 TP5 +24 V DC
 TP4 -5 V DC
 TP3 +15 V DC
 TP2 -24 V DC
 TP1 GND

IF LED IS:	STATION STATUS IS:
'OFF'	- No telephone is connected.
'ON STEADY'	- Telephone is connected and idle.
'FLASHING'	- Station is busy.

NOTE ALL VOLTAGES $\pm 5\%$

B-8SLU-B PCB OPEN FUSE DATA*

F1 +24 V DC, 3A:

1. DS9 LED out on SLU PCB.
2. Telephones connected to this PCB are completely inoperative.

F2 -24 V DC, 3A:

1. Same as F1.

F3 +5 V DC, 3A:

1. Phones squeal when on-hook.
2. DS9 LED is out.

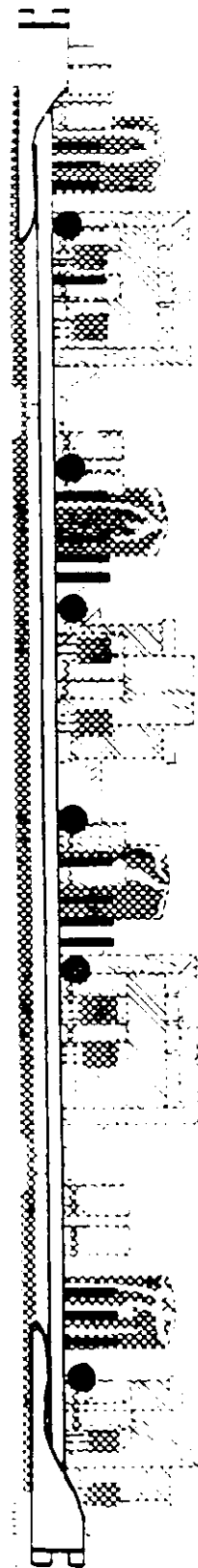
* Open fuse data is provided for troubleshooting only.
 Do not attempt to change PCB fuses in the field.

Strap circuit E1 to E2 for single line (2500 type) telephone.
 Strap circuit E2 to E3 for one button and OPX telephones.

VIEW: Front edge of card

Figure 9-2 LEDs AND TESTPOINTS, EK-824 1202 1648 (Page 4 of 5)

CO LINE (B-4COU-A) PCB



TP403 XPT Analog Line
 TP402 Tip Ckt
 TP401 Ring #4
 DS401 Status - RED
 TP3 -12 V DC

DS1 +15 & -12 V DC (GREEN)
 TP2 +15 V DC
 TP303 XPT Analog Line
 TP302 Tip Ckt
 TP301 Ring #3
 DS301 Status (RED)

DS2 +5 V DC (GREEN)
 TP1 GND
 TP203 XPT Analog Line
 TP202 Tip Ckt
 TP201 Ring #2
 DS201 Status (RED)

TP103 XPT Analog Line
 TP102 Tip Ckt
 TP101 Ring #1
 DS101 Status (RED)

NORMAL LED STATUS
DS1 and DS2 - ON
DS101 - 401: OFF - Line is idle ON - Line is busy or busied out by program

NOTE: ALL VOLTAGES $\pm 5\%$

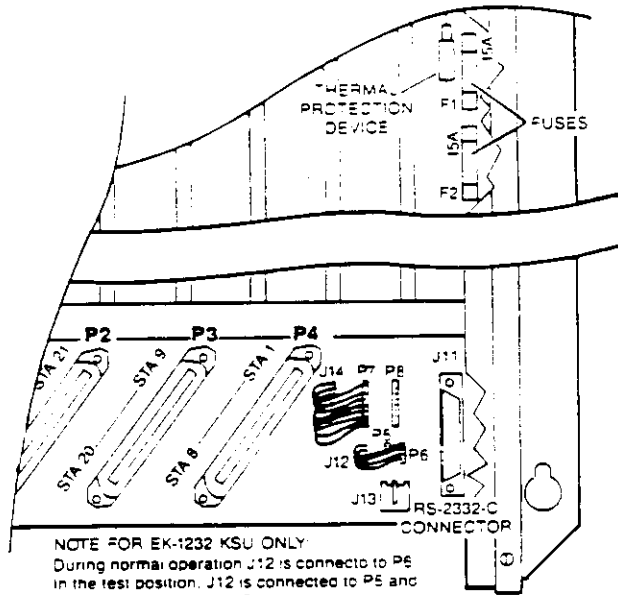
B-4COU-A PCB OPEN FUSE DATA*

- F1 +24 V DC, 3/4A:
 1. DS1 dims to DS2 brightness.
 2. Lines on affected PCB "dead".
- F2 -24 V DC, 3/4A:
 1. DS1 dims to DS2 brightness.
 2. Distorted MOH and audio on CO calls.
- F3 +5 V DC, 3/4A:
 1. DS2 LED out.
 2. Lines on affected PCB "dead".

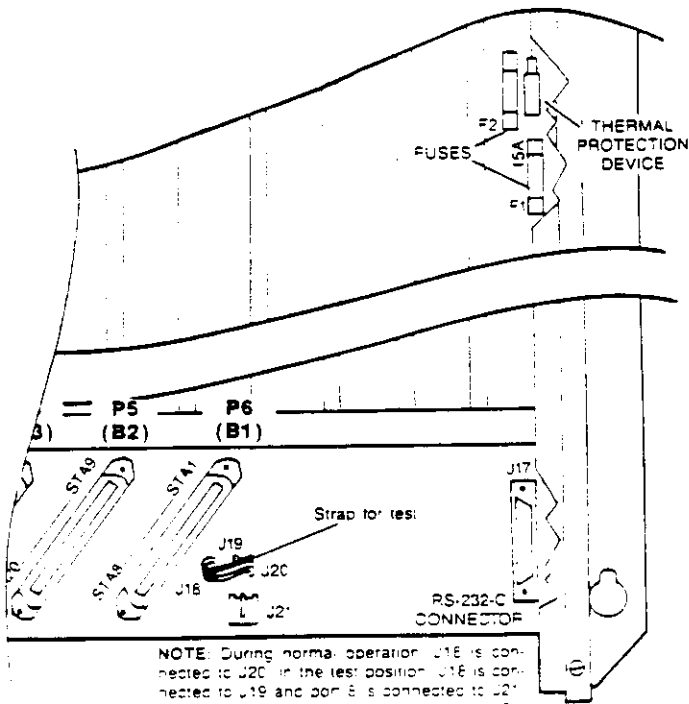
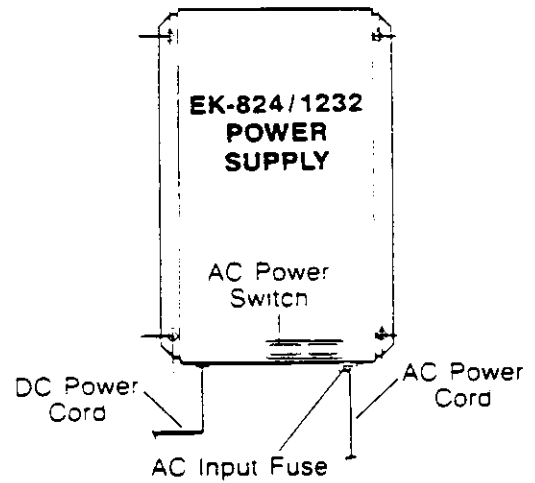
VIEW: Front edge of card

* Open fuse data is provided for troubleshooting only
 Do not attempt to change PCB fuses in the field.

Figure 9-2 LEDs AND TESTPOINTS, EK-824/1232/1648 (Page 5 of 5)



NOTE FOR EK-1232 KSU ONLY:
 During normal operation J12 is connected to P6. In the test position, J12 is connected to P5 and Port 8 is connected at J13. A test telephone can be plugged into J21, bypassing system cabling.



NOTE: During normal operation, J16 is connected to J20. In the test position, J16 is connected to J19 and port 8 is connected to J21. A test telephone can be plugged into J21, bypassing system cabling.

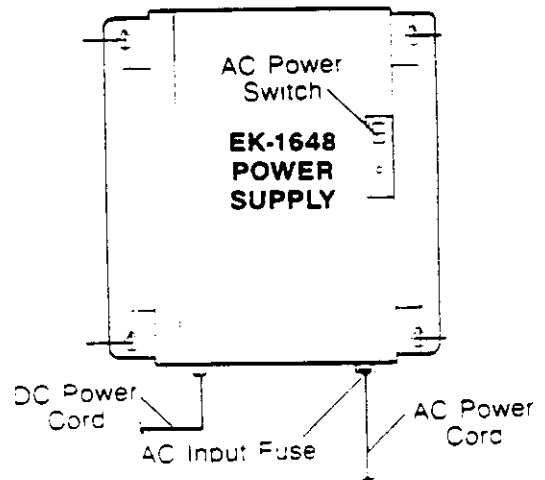


Figure 9-3 FUSE AND TEST CONNECTOR LOCATIONS. EK-824/1232/1648

Table 9-1 OPERATIONAL TEST PROCEDURE, EK-824/1232/1648 (Page 1 of 2)

FEATURE	AVAILABLE	VERIFIED?		PROGRAM- MABLE	SYMPTOM	PROBABLE CAUSE
		YES	NO			
INTERNAL						
INTERCOM	ALL			N		BSCU, BSLU, CPU
DIRECT STATION SELECTION	AT, MB			Y		BSCU, CPU
HOTLINE	MB			Y		BSCU, CPU
MICROPHONE MUTE	MB			N		BSCU, CPU
HANDSFREE ANSWERBACK	AT, MB, FB			Y		BSCU, CPU
ALERT TONE	AT, MB, FB			Y		BSCU, CPU
PAGING	ALL			Y		CPU, BSCU
CALL WAITING	ALL			Y		BSCU, BSLU, TCU, CPU
CALLBACK	AT, MB			Y		BSCU, BSLU, CPU
CALL FORWARDING	AT, MB			N		BSCU, CPU
MESSAGE WAITING	AT, MB, FB			N		BSCU, CPU
DO NOT DISTURB	MB			N		BSCU, CPU
DO NOT DISTURB OVERRIDE	AT			N		BSCU, CPU
BARGE IN	AT			Y		BSCU, CPU
DATE AND TIME	AT, MB			Y		BSCU, CPU
ALL ATTENDANT STATION	AT			Y		BSCU, CPU
VOLUME CONTROLS	AT, MB, FB, OB			N		BSCU, BSLU, CPU
DISTINCTIVE RINGING	ALL			Y		BSLU, BSCU, CPU, TCU
FORCED INTERCOM RINGING	AT, MB, FB			Y		BSLU, BSCU, CPU
EXTERNAL						
ANSWERING A CALL	ALL			Y		4COU, BSCU, BSLU
PLACING A CALL	ALL			Y		4COU, BSCU, BSLU
HOLD	ALL			Y		4COU, BSCU, BSLU
HANDSFREE	AT, MB			Y		BSCU, CPU
MONITOR	AT, MB, FB			Y		BSCU, CPU
FLASH	AT, MB			Y		BSCU, CPU
TRANSFER	ALL			N		BSCU, BSLU, CPU
LAST NUMBER REDIAL	ALL			N		BSCU, BSLU, CPU
SAVE	AT, MB			N		BSCU, BSLU, CPU
SPILL	FB, OB, SI			N		4COU, BSCU, BSLU

Verify according to Operational Specifications

For a Maintenance Manual, refer to the following:

- ATT - Attendant Multifactor
- EBB - Multifactor
- EB - Four Button
- CB - One Button
- SI - Single Line

Table 9-1 OPERATIONAL TEST PROCEDURE, EK-824/1232/1648 (Page 2 of 2)

FEATURE	AVAILABLE ¹	VERIFIED ²		PROGRAM MABLE	SYMPTOM	PROBABLE CAUSE ³
		YES	NO			
EXTERNAL (cont'd)						
CONFERENCE	AT, MB, FB			N		4COU, 8SCU, CPU
LINE QUEUING	AT, MB, FB			N		8SCU, 4COU
SPEED DIAL	ALL			Y		8SCU, 8SLU, 4COU
LOCAL ACCESS	ALL			Y		8SCU, 8SLU, 4COU
SPLIT DIALING	ALL			Y		8SCU, 8SLU, 4COU
PULSE TO TONE CONVERSION	ALL			N		8SCU, 8SLU, 4COU, CPU
NIGHT SERVICE	ALL			Y		4COU, 8SCU, 8SLU
UNIVERSAL NIGHT ANSWER	ALL			Y		8SCU, 8SLU, CPU, 4COU
RELEASE	AT			N		8SCU, 8SLU, 4COU
BUSY OUT LINES	AT			N		8SCU, 8SLU, 4COU
TERRANT SERVICE	ALL			Y		CPU
OPTIONAL						
MUSIC ON HOLD	ALL			Y		TGU, 8SLU, 8SCU, 4COU
BACKGROUND MUSIC	AT, MB, FB			Y		TGU, 8SLU, 8SCU
GLMR	ALL/PRINTER			Y		CPU
ACCOUNT CODE	ALL/PRINTER			Y		CPU

Verify according to Operational Specification For a maintenance record, circle item actually at fault

- 1. Checkout Method/Action
- 2. Call/Action
- 3. Loop Button
- 4. Cross Button
- 5. Sample Tone

Table 9-2 SYSTEM VOLTAGES. EK-824.1232.1548

DANGER: DIRECT CONTACT WITH POWER SUPPLY INPUT AND OUTPUT VOLTAGES MAY BE HARMFUL OR LETHAL. ONLY QUALIFIED PERSONNEL SHOULD ATTEMPT TO TAKE THE VOLTAGE READINGS OUTLINED IN THE CHART BELOW.

DESCRIPTION	READING	TEST CONDITION	TEST POINT LOCATION
AC Input	95 to 130 V AC	No load (i.e., no PCBs installed) and full load (i.e., all PCBs installed).	Measure service outlet or use power line monitor.
Power Supply + 24 V DC	+ 24.0 V DC to + 25.0	No load.	Measure between F2 (-) and GND (-) lug.
- 24 V DC	- 24.0 V DC to - 25.0 V DC	No load.	Measure between F1 (+) and GND (-) lug.
PCB Voltages + 5V DC	+ 4.75 V DC to + 5.25 V DC	Full load.	Measure between TP6 (+) and TP1 (-) on left most SLU/SCU PCB.
+ 5 V DC	+ 4.75 V DC to + 5.25 V DC	Full load.	Measure between TP6 (+) and TP1 (-) on any right most SLU/SCU PCB.
- 5 V DC	- 4.75 V DC to - 5.25 V DC	Full load.	Measure between TP4 (+) and TP1 (-) on any SLU/SCU PCB.
+ 15 V DC	+ 14.25 V DC to + 15.75 V DC	Full load.	Measure between TP3 (+) and TP1 (-) on any SLU/SCU PCB.
+ 24 V DC	+ 22.8 V DC to + 25.2 V DC	Full load.	Measure between TP5 (+) and TP1 (-) on any SLU/SCU PCB.
- 24 V DC	- 22.8 V DC to - 25.2 V DC	Full load.	Measure between TP2 (+) and TP1 (-) on any SLU/SCU PCB.
Sta. Voltages Multibutton. Four Button Data Power	+ 38 V DC to + 48 V DC	Telephone installed.	Open cover on 625 jack. Measure between RED (+) and GRN (-) lugs.
Single Line. One Button + 24 V DC	+ 22.8 V DC to + 25.2 V DC	Telephone installed.	Open cover on 625 jack. Measure between GRN (+) and BLK (-) lugs. and YEL (+) and BLK (-) lugs.
- 24 V DC	- 22.8 V DC to - 25.2 V DC	Telephone installed. (on hook)	Open cover on 625 jack. Measure between RED (+) and BLK (-) lugs.

Readings should be made with a digital voltmeter with a known accuracy of 1% or better.

Table 9-3 REPLACEABLE PARTS, EK-824/1232/1648

ITEM	PART NUMBER	DESCRIPTION	WHERE USED
KSU	86100	Key Service Unit, EK-1648	KSU
KSU	86200	Key Service Unit, EK-1232	KSU
KSU	84000	Key Service Unit, EK-824	KSU
B-PSU-A	86005A	Power Supply, EK-1648	KSU
B-PSU-B	86007	Power Supply, EK-1648	KSU
B-PSU-E	86206	Power Supply, EK-824/1232	KSU
B-CPU-B	86114	Central Processing Unit PCB	KSU
B-8SCU-C	86023	Station Card Unit PCB	KSU
B-8SLU-B	86027/A	Single Line Instrument Unit PCB	KSU
B-4COU-A	86010	CO Line Unit PCB	KSU
B-TGU-B	86033	Tone Generator Unit PCB	TGU
B-RTC-A	86028	Rear Time Clock Daughter Board	TGU
-	86015	DTMF Receiver Daughter Board	S/L TEL
-	86185	Special Loud Ringing Tone Board	S/L TEL
-	86187	TIE Electronic Ringer	Station
-	86073	MERITOR/DELPHI Display Multibutton Key Tel	Station
-	86070	MERITOR/DELPHI Multibutton Key Tel (Handfree)	Station
-	86072	MERITOR/DELPHI Multibutton Key Tel (Monitor)	Station
-	86071	MERITOR/DELPHI Four Button Key Tel	Station
-	86075	MERITOR/DELPHI Single Port DSS Console	Attendant
-	86115	MERITOR/DELPHI Dual Port DSS Console	Attendant
-	86057	MERITOR/DELPHI One Button Tel	Station
-	86076M	MERITOR/DELPHI Multibutton Wall Mounting Kit	Station
-	86077M	MERITOR/DELPHI Four Button/One Button Wall Mounting Kit	Station
-	86076A	MERITOR/DELPHI Replacement Wall Mount Hanger	Station
-	86063	ULTRACOM Display Multibutton Key Tel	Station
-	86080	ULTRACOM Multibutton Key Tel (Handfree)	Station
-	86082	ULTRACOM Multibutton Key Tel (Monitor)	Station
-	86061	ULTRACOM Four Button Key Tel	Station
-	86064	ULTRACOM Single Port DSS Console	Attendant
-	86120	ULTRACOM Dual Port DSS Console	Attendant
-	86067	ULTRACOM One Button Tel	Station
-	86066	ULTRACOM Multibutton Wall Mounting Kit	Station
-	86062	ULTRACOM Four Button/One Button Wall Mounting Kit	Station
F1, F2	-	KSU Fuse, 15 Amp (312/AGC)	KSU
-	-	AC Input Fuse, 10 Amp (313/MDL)	Power Supply
-	-	AC Input Fuse, 7 Amp (313/MDL)	Power Supply
-	TBD	ULTRACOM Handset (Carbon)	Station
-	TBD	ULTRACOM Handset (Electret)	Station
-	TBD	MERITOR/DELPHI Handset (Carbon)	Station
-	TBD	MERITOR/DELPHI Handset (Electret)	Station
-	TBD	ULTRACOM Handset Coil Cord	Station
-	TBD	ULTRACOM Line Cord	Station
-	TBD	MERITOR/DELPHI Handset Coil Cord	Station
-	TBD	MERITOR/DELPHI Line Cord	Station
-	-	Quad Station Cable	Station
-	-	66M1-50 Connection Blocks (w/clips)	KSU
-	-	625A4 Modular Station Jack	Station
-	-	625F4 Modular Station Jack	Station
-	-	Plug-In Power Line Surge Protector	Power Supply
-	-	Anti-Static Wrist Ground Strap	KSU
-	TBD	Key Cap Kit	Station
-	01333 IMG	EK-824/1232/1648 Installation & Maintenance Manual	-
-	01333 AT	EK-824/1232/1648 Attendant User Guide	-
-	01333 MB	EK-824/1232/1648 Multibutton User Guide	-
-	01333 FB	EK-824/1232/1648 Four Button User Guide	-
-	01333 OB	EK-824/1232/1648 One Button User Guide	-
-	01333 SL	EK-824/1232/1648 Single Line User Guide	-

Parts available from T.E. Communications, Inc. are indicated by a dash (-) in the "WHERE USED" column.
 Parts available from Telephone Equipment Manufacturers are indicated by "TBD" in the "PART NUMBER" column.

APPENDIX A
OPERATIONAL SPECIFICATION
FOR
EK-824/1232/1648 ATTENDANT MULTIBUTTON KEY TELEPHONE

CONTENTS	PAGE	CONTENTS	PAGE
ACCOUNT CODE CAPABILITY	A-2	LAST NUMBER REDIAL	A-11
ALERT TONE/PRIVACY TONE	A-2	LINE QUEUING	A-11
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ANSWERING A CALL	A-2	MONITOR	A-12
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BUSY-OUT LINES	A-3	NIGHT SERVICE	A-13
CALLBACK	A-3	PAGING	A-13
CALL FORWARDING	A-4	PLACING A CALL	A-14
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CONFERENCE	A-5	SAVE	A-15
DATE AND TIME	A-6	SPEED DIAL	A-15
DIRECT STATION SELECTION (DSS)	A-7	TERMINATING A CALL	A-19
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FLASH	A-8		
HANDSFREE	A-8		
HANDSFREE ANSWERBACK	A-8		
HOLD	A-9		
HOTLINE	A-9		
INTERCOM	A-10		

NOTE: If your telephone is equipped with a MON key, it does not have a speakerphone. Intercom calls can be received Handsfree (Handsfree Answerback), and outside calls may be monitored (Monitor). Handsfree CO calls are not permitted.

ACCOUNT CODE CAPABILITY

Account Codes (of up to nine digits) may be assigned to your calls.

To use with manually dialed call:

- *Lift handset (or press HF key).*
- *Press Line key.*
- *Dial number.*
- *Dial = (within six seconds).*
- *Dial Account Code number.*
- *Dial =.*

To use with Speed Dial:

- *Place Speed Dial call. Let number dial out.*
- *Dial = (within six seconds).*
- *Dial Account Code number.*
- *Dial =.*

To enter Account Code on an incoming call or outgoing call in progress:

- *Press INT key.*
- *Dial 500. This will assign the Account Code to the line being used. If station wants to assign an Account Code number to a specific line, the user may dial 501-516 to access lines 1-16.*
- *Enter Account Code number.*
- *Dial =.*
- *Return to line by pressing flashing Line key.*

ALERT TONE/PRIVACY TONE

The Alert Tone signal reminds you that your telephone is in the Handsfree Answerback mode. This feature is used to prevent unauthorized monitoring of conversations in your office or work area. The Alert Tone signal is a single one-half second beep which repeats as long as your phone is in the Handsfree Answerback mode. The length of time between Alert Tones is programmed during system installation.

ALTERNATE ATTENDANT STATION

This feature allows the attendant to direct all intercom and transferred calls to the alternate attendant which was assigned during installation.

To use Alternate Attendant Station:

- *Press ALT key. Key flashes.*

To return system to regular attendant station:

- *Press ALT key again. Key stops flashing.*

When the ALT mode is on, incoming calls will ring at both the attendant's and the alternate attendant's station. When the ALT mode is off, incoming calls will ring at the attendant's station (for a programmed duration), then at both the attendant's and alternate attendant's station.

ANSWERING A CALL

To answer an incoming call:

- *Lift handset (or press HF key).*
- *Press flashing Line key (1-16).*

Display:

LINE XX

You may not be able to answer all flashing lines. Split Ringing allows installation personnel to select which lines you should be able to answer.

BARGE IN

CAUTION: UNAUTHORIZED MONITORING OF CALLS USING THE BARGE IN FEATURE MAY BE INTERPRETED AS AN INVASION OF PRIVACY.

The Barge In feature permits the attendant to interrupt a conversation in progress.

To Barge In on a conversation:

- Lift handset.
- Press DSS key.

Display: **WAITING FOR YYY**

- Press BRG.IN key to join conversation.[†]

[†] All parties hear four splash tones. After a four second delay, the attendant can join the conversation.

Display: **BARGE IN TO YYY**

BUSY-OUT LINES

The attendant can Busy-Out a CO line by making it appear to be busy to all other stations in the system.

To initiate Busy-Out:

- Lift handset (or press HF key).
- Press LNT.
- Dial 7.
- Dial line number (01-16).

Display: **DISABLE LINE XX**

To cancel Busy-Out:

- Lift handset (or press HF key).
- Press LNT.
- Dial 7.
- Dial line number (01-16).

Display: **ENABLE LINE XX**

CALLBACK

A Callback request can be left at a busy station.

To leave a Callback request:

- Press C.BACK key.
- Hang up.

When the busy party becomes available, your telephone will ring and the C.BACK key will flash.

Display: **CALL BACK ST YYY**

To respond to the Callback request:

- Lift handset (or press HF key). C.BACK LED is extinguished.

Display: **EXTENSION YYY**

You will automatically be connected to the desired station.

CALL FORWARDING

You can have all your calls automatically transferred to another station in the system.

To forward calls to another telephone:

- *Lift handset (or press HF key).*
- *Press INT key. Listen for dial tone.*
- *Press #.*
- *Dial number of station to which calls will be forwarded. HLD/CNF key will flash.*
- *Hang up.*

Display:

FORWARD TO YYY

To cancel Call Forwarding:

- *Lift handset (or press HF key).*
- *Press INT key. Listen for dial tone.*
- *Press # #.*
- *Hang up. HLD/CNF key will extinguish.*

If you receive a Call Forwarded from another station, the following will appear:

Display:

FORWARD FROM YYY

The attendant can cancel all Call Forwarding conditions in the system.

To cancel all Call Forwarding conditions:

- *Lift handset (or press HF key).*
- *Press INT key.*
- *Dial 700.*

Display:

CLR ALL CALL FWD

A short tone will indicate that all Call Forwards have been cleared. A reorder tone indicates that the operation was not completed successfully. Repeat the procedure.

CALL WAITING

Call Waiting allows signals to be sent to your station which indicate that a Central Office (CO) or internal (Intercom) call is waiting to be answered. You must be busy on another call to receive Call Waiting signals.

Call Waiting, CO Call

When busy on another call, you may receive a signal that an outside (CO) call is waiting to be answered. This call may be a call ringing in to your station or a call transferred from another station. The CO Call Waiting indication is a double beep.

To answer a CO Call Waiting signal (if you have a DSS console):

- *Press flashing line key.*
- *Initial call put on Hold.*

To answer a CO Call Waiting signal (if you do not have a DSS console):

- *Press flashing line key. Initial call terminated.*
- OR
- *If busy on CO call, press HLD/CNF key.*
 - *Initial call put on Hold.*
 - *Press flashing line key.*

NOTE: Intercom calls cannot be placed on Hold.

Call Waiting, Internal

Internal Call Waiting provides your station, when you are busy on another call, with an indication that an internal call is waiting to be answered. The Internal Call Waiting signal is a single beep. If you have a DSS console, the DSS console key for the calling station will flutter. If you do not have a DSS console (installed or programmed), the ENT key will flash.

Display:

EXT YYY WAITING

To answer an Internal Call Waiting signal (if you have a DSS console):

- Press fluttering DSS key for calling station.

If you do not have a DSS console:

- Press flashing ENT key.
- Dial 4.

If you were busy on a CO call, the call will be placed on Hold and you will be connected to the calling party. If you were busy on an Intercom call, the call will be dropped and you will be connected to the calling party.

CONFERENCE

Up to three parties can be connected for a conference call. There are two types of Conference features: Add-On Conference and Line Conference.

Add-On Conference

To add an internal party to an outside call:

- Press PR RLS key. Call placed on Hold. Station is in the Intercom mode.
- Dial station number (or press appropriate DSS key) to be added to the conference call.

Display:

EXTENSION YYY

- Announce call and Line number.
- Immediately press flashing Line key.

The Line key flashes on the invited station's telephone.

To join the conference, the invited multibutton station user must:

- Lift handset (or press HF key).
- Press flashing Line key within 10 seconds.

When both you and the invited party have pressed the flashing line key, the conference will be established.

Line Conference

To join two outside lines on a conference call:

- Establish first call.
- Press HLD/CNF key. Call is placed on Hold.

Display:

HOLD LINE XX

- Establish second call on another line.

Display:

LINE XX

Display:

DIGITS

- Press HLD/CNF key. Second call placed on Hold.

Display:

HOLD LINE XX

- Press HLD/CNF key again. HLD/CNF key illuminates.
- Press both Line keys sequentially. Conference call is established.

NOTE: If an outside call is received while a conference call is being established, do not place the outside call on Hold. This will make that outside call a part of the conference call.

DATE AND TIME

Date and Time is used by the system for SMDR and display telephone presentations. This data can be entered at the attendant's station. The data below must be entered with less than thirty seconds between entries or a tone will be received indicating that you must start over again.

To enter Date and Time:

- Lift handset (or press HF key).
- Press LNT key.
- Dial 720. Clock/Calendar is now ready to be set.

Display:  CLOCK STOPPED

Display telephones show digits for each item entered.

- Press LNT key, then dial 721. Enter hour (2 digits, 24 hour clock, e.g., 1PM = 13).

Display:  HOUR NN

- Press LNT key, then dial 722. Enter minutes past the hour (2 digits, 00-59).

Display:  MINUTE NN

- Press LNT key, then dial 723. Enter seconds past minute (2 digits, 00-59).

Display:  SECOND NN

- Press LNT key, then dial 724. Enter day of week (2 digits, e.g., Sun = 01, Mon = 02, etc.).

Display: DAY NN

- Press LNT key, then dial 725. Enter day of month (2 digits, 01-31).

Display: DATE NN

- Press LNT key, then dial 726. Enter month of year (2 digits, 01-12).

Display: MONTH NN

- Press LNT key, then dial 727. Enter year (2 digits, 1984 = 84).

Display: YEAR NN

- Press LNT key, then dial 728. Clock/Calendar is now started.

Display: CLOCK STARTED

- Hang up handset (or press HF key).

Entries may be made in any order.

DIRECT STATION SELECTION (DSS)

The DSS console provides one button Intercom access to every station in the system.

To place an Intercom call using the DSS console:

- Lift handset (or press HF key).
- Press DSS key for station being called.

Display:

EXTENSION YYY

- DSS key LED will flash fast.

The DSS console also serves as a Busy Lamp Field (BLF) for the system. When a station is idle, the appropriate DSS Console LED is off. When a station is off-hook, the LED is on. When a station is in Do Not Disturb, the LED flashes slowly.

If your system does not have a DSS console installed or programmed, the telephone will automatically convert the 16 Line keys into Direct Station Selection Keys (for 6 seconds) when you press the INT key. This allows one button DSS access to selected stations. When your telephone is first installed, the system assigns stations 301-316 to keys 1-16, respectively. You can change the assignment of the DSS keys on the telephone to represent any station (301-348).

NOTE: When assigning DSS numbers, do not allow more than six seconds to elapse between steps. If you do, you will hear a reorder tone and you must begin the procedure again.

To store an Intercom number at a DSS key:

- Do NOT lift handset (or press HF key).
- Press OUT/MEM key. Key flashes.

Display:

PROGRAM MEMORY

- Press Bin key (1-16). Key flashes.

Display:

NUMBER TO BIN XX

- Dial *.
- Dial station number (001-348) to be stored.

Display:

*** DIGITS**

- Press Bin key again (1-16).

Display:

PROGRAM COMPLETE

A confirmation tone will be heard, indicating that the assignment has been made correctly.

To call a station using a DSS key:

- Lift handset (or press HF key).
- Press INT key.
- Press DSS key (1-16) for station you wish to call.

Display:

EXTENSION YYY

NOTE: When the programmed DSS keys are used for placing Intercom calls, the called station (if a key telephone) will receive a voice announcement unless it has been programmed otherwise.

To change the DSS keys to outside Line keys when the telephone is in the Intercom mode:

- Press OUT/MEM key.

Keys 1-16 now represent outside lines.

DO NOT DISTURB OVERRIDE

The attendant can make a voice announcement to a station when the station is in the DND mode.

To initiate DND override:

- *Lift handset.*
- *Press DSS Key.*

Display:

EXTENSION YYY

- *Make announcement.*

EQUAL ACCESS COMPATIBILITY

Equal Access allows the primary carrier to be selected for toll calls. This means that normal long distance calls can be automatically routed onto a selected service, such as MCI or SPRINT, instead of a Direct Distance Dialing (DDD) line. If your system is in the Equal Access area, the primary carrier selection is done during installation and does not affect the way you dial long distance calls.

Equal Access also allows you to dial out on up to ten additional carriers. These services are accessed by dialing ten, the carrier's dedicated three-digit code, followed by the area code and the telephone number. The attendant can provide information on these codes, if applicable to your system.

FLASH

To receive a new dia. tone without losing the line you are currently on:

- *Press FLASH key*

HANDSFREE

Handsfree operation allows for use of the speaker and microphone inside the telephone instead of the handset. If your telephone has a HF button, Handsfree operation is permitted.

To initiate Handsfree mode:

- *Press HF key. HF key illuminates.*

To return to handset operation:

- *Pick up handset. HF key extinguishes.*

To go from handset operation to Handsfree operation while on a call:

- *Press HF key. HF key lights.*
- *Hang up handset.*

HANDSFREE ANSWERBACK

Handsfree Answerback allows Intercom calls to be answered using the speaker and microphone in the telephone, instead of the handset. Intercom calls to four button and multibutton telephones are normally received in the Handsfree Answerback mode. If your system had Forced Intercom Ringing enabled during installation, Handsfree Answerback will not occur.

HOLD

There are three types of Hold for outside calls: I-Hold, Exclusive Hold and Automatic Hold.

I-Hold

I-Hold provides an indication (flashing LED) for the line on Hold at all key telephones in the system. The call can be picked up at any telephone. The appropriate line will flash fast at the telephone where the call was placed on I-Hold. The line will flash slowly on all other telephones.

To place a call on I-Hold:

- Press *HLD/CNF* key. *Line key flashes fast.*

Display:

HOLD LINE XX

To return to a call on I-Hold:

- Press appropriate *Line key* on any key telephone.

Exclusive Hold

Exclusive Hold provides a Hold indication only at the telephone where the call was placed on Hold. All other key telephones in the system will show the line as busy. This call can be retrieved only at the station where the call was placed on Hold.

To place a call on Exclusive Hold:

- Press *HLD/CNF* key.
- Press *FLASH* key (*within six seconds*).

Display:

HOLD LINE XX

To return to a call on Exclusive Hold:

- Press *flashing Line key* on appropriate telephone.

Automatic Hold

To initiate Automatic Hold:

- Press another *Line key*, *INT* or *PAGE* key. Call automatically placed on Hold.

Display:

LINE XX

To return to the call:

- Press *flashing Line key*.

NOTE: If call is left on Hold longer than the programmed period, the call will re-ring at the station which placed it on Hold. If still unanswered, it will ring at your station.

Display:

XX HOLD RCL YYY

HOTLINE

Hotline directly connects two Multibutton Key Telephones for communication and call transfer. If you have a DSS console (installed and/or programmed), Hotline is not used since the HL key becomes the ALT key. If you do not have a DSS console (installed and/or programmed), a Hotline partnership may be desired. The HOTLINE key will automatically place incoming calls on HOLD and establish hands-free conversation between the Hotline partners. The HL key also provides a busy indication for the Hotline partner.

If a Hotline partner's telephone is busy, the HL key will illuminate steadily. The other partner can signal the station by pressing the HL key. This will signal both partners with 2 beeps and cause the HLD/CNF key on the busy partner's telephone to flash quickly. When a Hotline partner is in the Do-Not-Disturb mode (DND), the HL key will flash slowly. A Hotline partner can override the DND state of the other partner.

To call a Hotline partner:

- *Lift handset (or press HF key).*
- *Press HL key.*

Display:

EXTENSION YYY

To transfer an outside call to a HL partner:

- *Press HL key. Call automatically placed on Hold and Handsfree Intercom call is established with Hotline partner.*
- *Announce call and hang up. Call transferred automatically to Hotline partner.*

Display:

XX TRANS TO YYY

To signal your Hotline partner that a call is waiting:

- *Press HL key. Hotline partner will hear 2-beeps and HLD/CNF key flashes fast.*
- *Hang up for call to ring your partner when your partner's telephone is idle.*
- *Do not hang up to announce call.*

Display:

XX TRANS TO YYY

To answer a call waiting signal from your Hotline partner:

- *Press HLD/CNF key to place the first call on Hold (if CO call). Speak Handsfree to Hotline partner.*

Display:

EXTENSION YYY

You may be part of a Hotline group, rather than a Hotline partnership. If you are part of a Hotline group, your Communications Manager can provide the details of the group configuration.

INTERCOM

To place an Intercom call:

- *Lift handset (or press HF key).*
 - *Press INT key.*
 - *Wait for dial tone. Dial station number.*
- OR
- *Lift handset (or press HF key).*
 - *Press DSS console key.*

Display:

EXTENSION YYY

The called party (if a key telephone) can automatically communicate with you Handsfree, unless Forced Intercom Ringing is enabled on a system-wide basis. Single Line (2500 type) and One Button telephones will ring.

If the called station cannot be reached, one of the following displays will appear:

Display:

WAITING FOR YYY

Display:

YYY NOT EXIST

If you want the dialed key telephone to ring:

- *Lift handset (or press HF key).*
- *Press INT key.*
- *Dial 1.*
- *Dial station number (301-348).*

Display:

RINGING YYY

The called station will ring and the person must use the handset to answer.

To receive ring signals rather than voice announcements at your telephone (cancel Handsfree Answerback):

- *Lift handset (or press HF key).*
- *Press INT key.*
- *Dial 1.*

Display:

FORCED RING ON

To return the telephone to voice-announced Intercom calls (enable Handsfree Answerback):

- Lift handset (or press HF key).
- Press INT key.
- Dial 718.

Display:

FORCED RING OFF

A voice-announced Intercom call coming into your telephone is indicated by 3 short beeps and a flashing HF key.

To answer an Intercom call Handsfree:

- Do not press any keys.
- Answer announcement.

To answer a call privately, or a call that is ringing:

- Lift handset.

Display:

EXT YYY CALLING

To determine your station number (telephone must be idle):

- Press the "1" key on the dial pad.

Display:

THIS IS EXT YYY

LAST NUMBER REDIAL

The last outside number dialed is automatically stored in memory and can be redialed.

To redial the last number on a non-display telephone:

- Lift handset (or press HF key).
- Press Line key used for original call. Listen for dial tone.
- Press Line key again.

OR

- Lift handset (or press HF key).
- Press INT key.
- Dial 830.

Display:

LINE XX

Display:

DIGITS

When the line used for the original call is busy, use another line in the same group.

To redial the last outside number (on display telephones only):

- Lift handset (or press HF key).
- Press Line key.

Display:

LINE XX

- Press REDIAL key.

Display:

DIGITS

OR

- Press the Line key again.

LINE QUEUING

To queue (wait your turn) for an outside line when the line needed is busy:

- Press desired Line key.
- Press C.BACK key.

The telephone will ring and the Line key will flash when the line is available.

Display:

CALL BACK CO XX

To respond to a Line Queue signal:

- Lift handset (or press HF key).
- Listen for dial tone.
- Dial number.

MESSAGE WAITING

If a Four Button or Multibutton station is called and is unanswered, a Message Waiting indication (a tone and a flashing MSG.WAIT key) may be left, signaling the station user that a call is to be returned.

To leave a Message Waiting indication:

- *Press MSG.WAIT key. Key flashes at called station.*
- *Hang up.*

The MSG.WAIT key on the called telephone will flash, indicating that a message is waiting. The called party will hear a tone after 10 seconds, each time the station goes idle, until the Message Waiting indication is answered.

Display:

MSG FROM EXT YYY

To respond to a Message Waiting indication:

- *Lift handset (or press HF key).*
- *Press flashing MSG.WAIT key.*

Display:

EXTENSION YYY

The station which placed the Message Waiting indication is automatically signaled.

Display:

EXT YYY CALLING

To cancel a Message Waiting signal:

- *Do not lift handset (or press HF key).*
- *Press MSG.WAIT key.*
- *Continue to press MSG.WAIT key until all Message Waiting indications are canceled. Key will extinguish.*

MONITOR

Telephones without the Handsfree feature are equipped with a Monitor (MON) key. Using the Monitor feature, you can dial and monitor the progress of an outside call without lifting the handset. You can also monitor an outside call while waiting for the called party to take your call off Hold.

To dial an outside number:

- *Press MON key.*
- *Select a line.*
- *Dial desired number.*
- *Lift handset to speak to the called party.*

To monitor an established outside call:

- *Press MON key.*
- *Hang up.*
- *When the called party returns to the telephone, lift the handset to speak.*

MUSIC ON HOLD/BACKGROUND MUSIC

Music On Hold (MOH) and Background Music (BGM) may be connected to your system. If installed, BGM is provided through the speaker in your telephone and is controlled by the left volume control thumbwheel. If you have a display telephone, BGM volume is controlled by the VOL UP and VOL DN keys. The HLD/CNF key is pressed to turn BGM on and off. BGM can also be broadcast over external paging equipment. MOH provides music to outside calls which have been placed on Hold.

NIGHT SERVICE

To put the system in the night mode (from a non-display telephone):

- Turn the left volume control counterclockwise until you hear a "click". LNT key illuminates indicating that the Night Transfer mode is activated.

To resume normal operation (from a non-display telephone):

- Turn left volume control clockwise until you hear a "click". LNT key extinguishes.

At display telephones, to put the system in the night mode:

- Do not lift handset (or press HF key).
- Dial 2.

Display:

NIGHT MODE ON

To resume normal operation:

- Do not lift handset (or press HF key).
- Dial 2 again.

Display:

NIGHT MODE OFF

Assigned Night Answer

Assigned Night Answer (ANA) automatically transfers incoming ringing to specific stations when the system is in the night mode. Stations which do not receive line ringing and incoming access during day hours can be programmed for Assigned Night Answer. Assigned Night Answer must be individually programmed for each station.

To answer a night mode call ringing at your telephone:

- Lift handset.
- Press flashing Line key.

Universal Night Answer

When the system is in the night mode, Universal Night Answer (UNA) allows calls which ring the external paging equipment or alerting device to be answered at designated stations. Stations which do not receive line ringing and incoming access during night hours (i.e., ANA) can be programmed for Universal Night Answer. Universal Night Answer must be individually programmed for each line and for each station.

To answer a night mode call ringing over the paging system or external alerting device:

- Lift handset.
- Press flashing Line key.
OR
- Lift handset.
- Press LNT key.
- Dial 69.

PAGING

All Call Page will page the whole system. Zone Page will page selected areas.

All Call Page

To make an All Call Page:

- Lift handset (or press HF key).
- Press PAGE key.
- Make announcement.
- Hang up.
OR
- Lift handset (or press HF key).
- Press LNT key.
- Dial 60.

Display: 60

- *Make announcement.*
- *Hang up.*

Zone Page

To make a Zone Page:

- *Lift handset (or press HF key).*
- *Press LNT key. Listen for dial tone.*
- *Dial zone (61-67).*

Display: 61

through

Display: 67

- *Make announcement.*
- *Hang up.*

PLACING A CALL

To place an outside call:

- *Lift handset (or press HF key).*
- *Press Line key (1-16).*

Display: LINE XX

- *Wait for dial tone. Dial telephone number.*

Display: DIGITS

To display duration of a call while on a call:

- *Press VOL UP key.*

Display: TIMER HR-MN

HR designates hours (00-99) and MN designates minutes (00-99).

To return to the date and time display:

- *Press VOL DN key.*

Display: DATE AND TIME

To preselect a line:

- *Press Line key (1-16) before lifting handset or pressing HF key.*

Display: LINE XX

PULSE TO TONE CONVERSION

You can change the signaling mode your telephone use dial on CO lines from pulse (DP) to tone (DTMF). To con dialed digits from pulse to tone:

- *Lift handset (or press HF key).*
- *Press line key.*
- *Dial *.*
- *Dial number.*

The * may be entered at any point in the dialing sequence. The digits preceding the * are dialed as pulse digits. The digits succeeding the * are dialed as tone digits. The telephone reverts to pulse dialing as soon as you hang up.

SAVE

The SAVE feature stores a frequently called number for automatic dialing at a later time.

To SAVE a number:

- Lift handset (or press HF key).
- Select outgoing Line key.
- Dial number.
- Press SAVE key after digits are dialed or while engaged on a call.

Display:

NUMBER SAVED

- Hang up.

To dial a number stored with the SAVE key:

- Lift handset (or press HF key).
- Press Line key.
- Press SAVE key.

NOTE: The feature is available on display telephones only.

SPEED DIAL

The System utilizes two types of memory dialing: Station Speed Dial and System Speed Dial.

Speed Dial permits either the attendant (System and Station Speed Dial) or any telephone user (Station Speed Dial only) to store frequently used telephone numbers for easy future access. Bins can be chained together to accommodate numbers greater than 16 digits.

Station Speed Dial

A station can be programmed for individual speed dialing by using the first 16 keys as bin storage locations. The station must be idle during Speed Dial programming. Each bin can store one telephone number, with a maximum of 16 digits (including directives and chaining commands).

To store Station Speed Dial numbers:

- Do not lift handset (or press HF key).
- Press MEM key. Key flashes.

Display:

PROGRAM MEMORY

- Press bin (1-16) where number is to be stored. Key flashes.

Display:

NUMBER TO BIN XX

- Dial number to be stored.

Display:

DIGITS

- Press Bin key again. Bin key and MEM key stops flashing.

Display:

PROGRAM COMPLETE

To dial Station Speed Dial numbers:

- Lift handset (or press HF key).
- Select a line.

Display:

LINE XX

- Press MEM key.
- Press bin (1-16).

Display:

LINE XX

Display:

DIGITS

Chaining

To dial a Speed dial number with a manually-dialed number:

- Wait for Speed Dialing to finish.
- Dial second number.

Manual Chaining

To manually chain Station Speed Dial numbers (as part of the same call):

- Lift handset (or press HF key).
- Select a line.
- Press MEM key.
- Press bin keys in the order they should be dialed.

To manually chain a Station Speed Dial bin with a System Speed Dial bin:

- Lift handset (or press HF key).
- Press LNT key.
- Dial 8 *.
- Dial bin number (01-16 or 31-80) or press bin key (1-16).
- Continue entering bin numbers or press bin keys (1-16) until the last bin in the chain is selected.
- Dial *.

To manually chain a Station Speed Dial bin with a System Speed Dial bin on a line that you designate:

- Lift handset (or press HF key).
- Press line key.
- Press OUT/MEM key.
- Dial *.
- Dial system bin number (31-80) or press station bin key (1-16).
- Continue entering bin numbers (31-80) or press bin keys (1-16) until the last bin in the chain is selected.
- Dial *.

System Speed Dial

Up to 50 frequently dialed numbers can be programmed into system memory by the attendant and are available to every station.

To dial System Speed Dial numbers:

- Lift handset (or press HF key).
- Press LNT key.
- Dial desired code (31-88).

Display:

LINE XX

Display:

DIGITS

Programming System Speed Numbers

The following procedure is used to store the 50 Speed Dial numbers. Each number can be a maximum of 16 digits (including directives and chaining commands).

To store or change numbers up to 16 digits long:

- To preselect a line, press Line key.
- Press MEM key. Key illuminates. Dial tone audible.

Display:

PROGRAM MEMORY

- Select and press any bin key (1-16). LED key illuminates.

Display:

NUMBER TO BIN XX

- Dial *.
- Enter System Speed Dial bin number (831-880).

Display:

DIGITS

- Dial number to be stored.

Display:

DIGITS

- Press illuminated bin key (1-16) again. Number is now stored and LED will extinguish.

Display:

PROGRAM COMPLETE

Automatic Chaining

A Speed Dial bin may be automatically chained to a second System or Station Speed Dial bin. The number in the second bin will be automatically dialed after the first bin dials out. The second number will always be dialed as part of the first call. The command for chaining is entered as part of the Speed Dial number.

To automatically chain Speed Dial bins:

- Dial number into bin being programmed.
- Dial *.
- Dial number of bin (01-16 or 31-80) to which bin being programmed should be chained.
- Press bin key to complete programming sequence.
- Store number in second bin (i.e., bin to which first number is chained).

To access chained numbers:

- Dial first bin location.

Speed Dial Directives

Speed Dial Directives may be programmed into Speed Dial Bins to increase the flexibility of Speed Dialing. Each character in the directive is counted as a digit. If the directive is to be the first entry in a station bin, it must be preceded by an additional *.

Directives *81, *82, *83 and *84 - System Speed Dial COS Restrictions

The attendant can assign Class of Service restrictions to numbers stored in System Speed Dial bins by using the directives *81, *82, *83 and *84. In Toll Restriction programming, each of these directives is assigned to specific Classes of Service. When the directive is entered into a System Speed Dial bin, only those stations with Classes of Service which are allowed under the specific directive may dial the succeeding digits. All other stations are restricted from using the bin.

For example, if Class of Service 4 is to be the only COS that can dial 12089262000 using System Speed Dial bin 85, program bin 850 with *8112089262000. In TOLL RESTRICTIONS (MISC) system programming, assign the directive *81 to COS 4 (i.e., 00001000). Stations with Class of Service 4 will be the only stations permitted to use bin 850.

If the directive *81, *82, *83 or *84 is not used in conjunction with the directive *85, dialing restrictions will not be imposed on any digits manually dialed after the bin dials out.

Directive *85 - Toll Restriction Restored

The directive *85 is entered at the end of a System Speed Dial bin if one of the directives *81, *82, *83 or *84 has been entered at the beginning. The *85 directive turns normal Toll Restriction back on after the System Speed Dial number has dialed out. If the System Speed Dial number is used to access an OCC, the *85 directive assures that normal dialing restrictions will be imposed after the OCC is accessed.

For example, *8119262000 *85 stored in a System bin indicates that only stations with access to the *81 directive can use the bin, and normal Toll Restriction is in force after the bin dials out.

Directives *86 and *87 - Suppressed Digits

These directives allow selected digits within a System Speed Dial bin to be suppressed on the telephone display and SMDR printout. The directive *86 denotes the beginning of suppressed digits; *87 the end. This prevents unauthorized access to OCC access codes, account codes, or restricted Speed Dial numbers.

For example, in the bin programmed with 1*869262000*87, the 1 will display and print, the 9262000 will be suppressed.

Directive *88

The *88 directive is used to change the dialing mode of a Speed Dial number from pulse (DP) to tone (DTMF). The digits preceding the *88 are dialed as DP digits. The digits succeeding the *88 are dialed as DTMF digits. This directive is useful if your system is in a DP area and you have OCCs which require DTMF.

For example, when using a bin containing the digits 1203 *88 9262000, the digits 1203 will be Dial Pulsed and the digits 9262000 will dial out as DTMF tones.

Directive *89 and *90

The directives *89 and *90 are used to designate the beginning and end of Account Codes. These directives assure that Account Codes will not be dialed as digits and will be properly recorded on the SMDR.

For example, a bin programmed with 9262000 *89432 *90 will dial out 9262000 and automatically assign 432 as the Account Code.

Directive *91 - Display Telephone Microphone Off

If a Speed Dial number will normally be followed by a manually dialed number, enter the directive *91 as the last entry in the bin. This directive turns off the display telephone Handsfree microphone for 15 seconds, assuring correct manual dialing. If the directive *91 is not programmed, background noise through the display telephone microphone may cause the system to misinterpret the actual dialed digits.

For example, if the Speed Dial number 926200045451 accesses an Other Common Carrier (OCC), and manual dialing is desired after OCC dial tone is returned, program a bin with 926200045451 *91. When a display telephone uses this bin, the microphone will be muted for 15 seconds after the last digit dials out. This assures correct manual dialing.

Directive *92 - Display Telephone Microphone On

This directive cancels the directive *91. For example, if you wish to chain a station bin ending in *91 to another station bin, program *92 as the first entry in the second bin. The Handsfree microphone will be enabled as soon as the second bin dials out.

For example, assume System Speed Dial bin 850 (containing 926200045451 *91) is to be chained to Station Speed Dial bin 01 (containing *92 3888000). After bin 850 dials out, the display telephone microphone is turned off. When the system sees the directive *92, the microphone is turned back on as soon as Station Speed Dial bin 01 dials out. If the *92 directive was not entered into station bin 01, the microphone could remain off for as long as ten seconds after bin 01 completed dialing.

Directives *93, *94 and *95

These directives are used to enter pauses into Speed Dial bins. The directive *93 enters one pause; *94 enters two pauses; *95 enters three pauses. The duration of the pause is programmed during system installation.

Pauses may be entered when the system is installed behind a PBX. For example, if the PBX access code for an outside line is 9, and the number to be Speed Dialed is 9262000, program the bin with 9 *939262000. The system will pause after the first 9 is dialed, and then continue dialing the rest of the Speed Dial number. The pause may be necessary to allow the PBX time to seize the outside line.

TERMINATING A CALL

To terminate a call:

- *Hang up or press RLS key.*

† If telephone is in the Handsfree mode, press HF key.

NOTE: The Release (RLS) key is used to disconnect an outside or Intercom call without replacing the handset.

TRANSFER

The attendant can transfer calls to any station in the system using the Direct Station Selection (DSS) console. Outside calls can be transferred to both busy and idle stations.

You can transfer an incoming call to another station by one of two methods: Unscreened (Unannounced) or Screened (Announced):

Unscreened (Unannounced) Transfer

To make an Unscreened Transfer (if you have a DSS console):

- *Press DSS key.*
- *Hang up.*†

† To transmit Call Waiting tones, wait two seconds before hanging up.

Display:

XX TRANS TO YYY

To make an Unscreened Transfer (if you do not have a DSS console):

- *Press LNT key.*
- *Dial station number to receive transfer.*
- *Hang up.*

Display:

EXTENSION YYY

The call will ring at the station receiving the transfer. If the receiving party does not answer, the call will ring at the attendant's station.

Screened (Announced) Transfer

To make a Screened Transfer (if you have a DSS console):

- *Press DSS key.*

Display:

XX TRANS TO YYY

- *Announce call.*
- *Hang up.*

If the called party lifts the handset to respond, press the DSS key again to send the call automatically. This is especially useful if the attendant screens calls for single line (2500 type), one button and four button stations.

To make a Screened Transfer (if you do not have a DSS console):

- *Press LNT key.*
- *Dial station number (or press DSS key) to receive transfer.*

Display:

EXTENSION YYY

- *Announce call.*
- *Hang up.*

If the party does not wish to take the call:

- *Do not hang up.*
- *Press the flashing Line key to return to the call.*

Display:

LINE XX

If you expect a Screened Transfer to be referred to a third party, you can Transfer the call so that it can be easily passed to another station.

To Transfer a call so that it can be passed:

- Press LNT key.
- Dial station number (301-348) to receive Transfer.
- Announce call.

If the called party refers the call to another station:

- Press LNT key.
- Dial number of station (301-348) to which call was referred.
- Announce call.

You can continue to pass the call until it is accepted.

Handsfree Transfer

If, upon making an Announced Transfer, the party requests a Handsfree Transfer:

- Press appropriate DSS key again.

The receiving party can communicate in the Handsfree mode.

To answer a transferred call:

Display:

XX TRANS FRM YYY

- Press fluttering Line key.

Display:

LINE XX

VOLUME CONTROLS

Two volume control thumbwheels are located on the front edge of the telephone. The left thumbwheel is used to adjust the volume of the Page Receive, Splash Tone, Ring Tone and Background Music (BGM). The right thumbwheel controls the volume of incoming Handsfree Answerback conversations. To increase volume turn the thumbwheels counter-clockwise. On display telephones, volume is controlled by the VOL UP and VOL DN keys.

NOTE: Turning the left volume control clockwise until a click is heard will put the system in the night mode.

APPENDIX B OPERATIONAL SPECIFICATION FOR EK-824/1232/1648 MULTIBUTTON KEY TELEPHONE

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NOTE: If your telephone is equipped with a MON key, it does not have a speakerphone. Intercom calls can be received Handsfree (Handsfree Answerback), and outside calls may be monitored (Monitor). Handsfree CO calls are not permitted.

ACCOUNT CODE CAPABILITY

Account Codes (of up to nine digits) may be assigned to your calls.

To use with manually dialed call:

- Lift handset (or press HF key).
- Press Line key.
- Dial number.
- Dial = (within six seconds).
- Dial Account Code number.
- Dial =.

To use with Speed Dial:

- Place Speed Dial call. Let number dial out.
- Dial = (within six seconds).
- Dial Account Code number.
- Dial =.

To enter Account Code on an incoming call or outgoing call in progress:

- Press LNT key.
- Dial 500. This will assign the Account Code to the line being used. If station wants to assign an Account Code number to a specific line, the user may dial 501-516 to assign to lines 1-16.
- Enter Account Code number.
- Dial =.
- Return to line by pressing flashing Line key.

ALERT TONE / PRIVACY TONE

The Alert Tone signal reminds you that your telephone is in the Handsfree Answerback mode or a Barge In is active. This feature is used to prevent unauthorized monitoring of conversations in your office or work area. The Alert Tone signal is a single one-half second beep which repeats as long as your phone is in the Handsfree Answerback or Barge In mode. The length of time between Alert Tones is programmed during system installation.

ANSWERING A CALL

To answer an incoming call:

- Lift handset (or press HF key).
- Press flashing Line key (1-16).

Display:

LINE XX

You may not be able to answer all flashing lines. Split Ringing allows installation personnel to select which lines you should be able to answer.

BARGE IN

The attendant may Barge In to your telephone conversation. When the attendant is going to barge in, you will hear 4 short beeps, and after a 4 second delay, the attendant's voice

Display:

YYY BARGING IN

CALLBACK

A Callback request can be left at any busy station, except for the attendant.

To leave a Callback request:

- Press C.BACK key.
- Hang up.

When the busy party becomes available, your telephone will ring and the C.BACK key will flash.

Display:

CALL BACK ST YYY

To respond to the Callback request:

- Lift handset (or press HF key) C.BACK LED is extinguished.

Display:

EXTENSION YYY

You will automatically be connected to the desired station.

CALL FORWARDING

You can have all your calls automatically transferred to another station in the system.

To forward calls to another telephone:

- Lift handset (or press HF key).
- Press INT key. Listen for dial tone.
- Press #.
- Dial number of station to which calls will be forwarded. HLD/CNF key will flash.
- Hang up.

Display:

FORWARD TO YYY

To cancel Call Forward:

- Lift handset (or press HF key).
- Press INT key. Listen for dial tone.
- Press # #.
- Hang up. HLD/CNF key will extinguish.

If you receive a call forwarded from another station, the following will appear:

Display:

FORWARD FROM YYY

To forward calls to your Hotline partner (if one is assigned):

- Press HL key when telephone is idle.

To cancel Call Forward to your Hotline partner:

- Press HL key again.

CALL WAITING, CO CALL

When busy on another call, you may receive a signal that an outside (CO) call is waiting to be answered. This call may be a call ringing in to your station or a call transferred from another station. The CO Call Waiting indication is a double beep.

To answer a CO Call Waiting signal:

- Press flashing line key. Initial call terminated.
OR
- If busy on CO call, press HLD/CNF key.
- Initial call put on Hold.
- Press flashing line key.

NOTE: Intercom calls cannot be placed on Hold.

CALL WAITING, INTERNAL

Internal Call Waiting provides your station, when you are busy on another call, with an indication that an internal call is waiting to be answered. The Internal Call Waiting signal is a single beep and flashing HLD/CNF key if the call is from another station; two beeps and flashing HLD/CNF key if the call is from the attendant or hotline partner.

Display:

EXT YYY WAITING

To answer an Internal Call Waiting signal:

- Press HLD/CNF key.

If you were busy on a CO call, the call will be placed on Hold and you will be connected to the calling party. If you were busy on an Intercom call, the call will be dropped and you will be connected to the calling party.

CONFERENCE

Up to three parties can be connected for a conference call. There are two types of Conference features: Add-On Conference and Line Conference.

Add-On Conference

To add an internal party to an outside call:

- Press *PR RLS* key. Call placed on Hold. Station is in the Intercom mode.
- Dial station number (or press appropriate DSS key) to be added to the conference call.

Display:

EXTENSION YYY

- Announce call and Line number.
- Immediately press flashing Line key (key will continue to flash).

The Line key flashes on the invited station's telephone.

To join the conference call, the invited multibutton station user must:

- Lift handset (or press *HF* key).
- Press flashing Line key within 10 seconds.

When both you and the invited party have pressed the flashing Line key, the conference will be established.

Line Conference

To join two outside lines on a conference call:

- Establish first call.
- Press *HLD/CNF* key. Call is placed on Hold.

Display:

HOLD LINE XX

- Establish second call on another line.

Display:

LINE XX

Display:

DIGITS

- Press *HLD/CNF* key. Second call placed on Hold.

Display:

HOLD LINE XX

- Press *HLD/CNF* key again. *HLD/CNF* key illuminates.
- Press both Line keys sequentially. Conference call is established.

NOTE: If an outside call is received while a conference call is being established, do not place the outside call on Hold. This will make that outside call a part of the conference call.

DIRECT STATION SELECTION (DSS)

The Multibutton Key Telephone will automatically convert the 16 Line keys into Direct Station Selection Keys (for 6 seconds) when you press the *INT* key. This allows one button DSS access to selected stations. When your telephone is first installed, the system assigns stations 301-316 to keys 1-16, respectively. You can change the assignment of the DSS keys on the telephone to represent any station (301-348).

The DSS keys serve as a Busy Lamp Field for the stations assigned to them. When a station is idle, the corresponding DSS key is off. When a station is busy, the key is on. When a station is in Do Not Disturb, the key flashes slowly.

NOTE: When assigning DSS numbers, do not allow more than six seconds to elapse between steps. If you do, you will hear a reorder tone and you must begin the procedure again.

To store an Intercom number at a DSS key:

- Do NOT lift handset or press *HF* key.
- Press *INT* MEM Key Flasher

Display:

PROGRAM MEMORY

- Press Bin key (1-16). Key flashes.

Display:

NUMBER TO BIN XX

- Dial *.
- Dial station number (301-348) to be stored.

Display:

*** DIGITS**

- Press Bin key again (1-16).

Display:

PROGRAM COMPLETE

A confirmation tone will be heard, indicating that the assignment has been made correctly.

To call a station using a (DSS) key:

- Lift handset (or press HF key).
- Press INT key.
- Press DSS key (1-16) for station you wish to call.

Display:

EXTENSION YYY

NOTE: When the programmed DSS keys are used for placing Intercom calls, the called station (if a key telephone) will receive a voice announcement unless it has been programmed otherwise.

To change the DSS keys to outside Line keys when the telephone is in the Intercom mode:

- Press OUT/MEM key.

Keys 1-16 now represent outside lines.

DO NOT DISTURB (DND)

You can block all voice and tone signals at your station by placing your telephone in the DND mode.

To activate the DND feature:

- Do not lift handset (or press HF key).
- Press DND key. Key flashes.

Display:

DO NOT DISTURB

To cancel Do Not Disturb:

- Press DND key. Key stops flashing.

Once a station is in DND mode, only the attendant's station or your Hotline partner (if there is one) can signal your extension.

EQUAL ACCESS COMPATABILITY

Equal Access allows the primary carrier to be selected for toll calls. This means that normal long distance calls can be automatically routed onto a selected service, such as MCI or SPRINT, instead of a Direct Distance Dialing (DDD) line. If your system is in the Equal Access area, the primary carrier selection is done during installation and does not affect the way you dial long distance calls.

Equal Access also allows you to dial out on up to ten additional carriers. These services are accessed by dialing ten, the carrier's dedicated three-digit code, followed by the area code and the telephone number. The attendant can provide information on these codes, if applicable to your system.

REVISION HISTORY

FLASH

To receive a new dial tone without losing the line you are currently on:

- Press *FLASH* key.

HANDSFREE

Handsfree operation allows for use of the speaker and microphone inside the telephone instead of the handset. If your telephone has a HF button, Handsfree operation is permitted.

To initiate Handsfree mode:

- Press *HF* key. *HF* key illuminates.

To return to handset operation:

- Pick up handset. *HF* key extinguishes.

To go from handset operation to Handsfree operation while on a call:

- Press *HF* key. *HF* key lights.
- Hang up handset.

HANDSFREE ANSWERBACK

Handsfree Answerback allows Intercom calls to be answered using the speaker and microphone in the telephone, instead of the handset. Intercom calls to four button and multibutton telephones are normally received in the Handsfree Answerback mode. If your system had Forced Intercom Ringing enabled during installation, Handsfree Answerback will not occur.

HOLD

There are two types of Hold for outside calls: I-Hold and Exclusive Hold.

I-Hold

I-Hold provides an indication (flashing LED) for the line on Hold at all key telephones in the system. The call can be picked up at any telephone. The appropriate line will flash fast at the telephone where the call was placed on I-Hold. The line will flash slowly on all other telephones.

To place a call on I-Hold:

- Press *HLD/CNF* key. *Line key flashes fast.*

Display:

HOLD LINE XX

To return to a call on I-Hold:

- Press appropriate *Line key* on any key telephone.

Exclusive Hold

Exclusive Hold provides a Hold indication only at the telephone where the call was placed on Hold. All other key telephones in the system will show the line as busy. This call can be retrieved only at the station where the call was placed on Hold.

To place a call on Exclusive Hold:

- Press *HLD/CNF* key.
- Press *FLASH* key.

Display:

HOLD LINE XX

To return to a call on Exclusive Hold:

- Press *flashing Line key* on appropriate telephone.

NOTE: If call is left on Hold longer than the programmed period, the call will re-ring at your station.

Display:

XX HOLD RECALL YYY

If still unanswered, it will ring at the operator's station.

HOTLINE

Hotline directly connects two Multibutton Key Telephones for communication and call transfer. The **HOTLINE** key will automatically place incoming calls on **HOLD** and establish handsfree conversation between the Hotline partners. The **HL** key also provides a busy indication for the Hotline partner.

If a Hotline partner's telephone is busy, the **HL** key will illuminate steadily. The other partner can signal the station by pressing the **HL** key. This will signal both partners with 2 beeps and cause the **HLD/CNF** key on the busy partner's telephone to flash quickly. When a Hotline partner is in the Do-Not-Disturb mode (**DND**), the **HL** key will flash slowly. A Hotline partner can override the **DND** state of the other partner.

To call a Hotline partner:

- Lift handset (or press **HF** key).
- Press **HL** key.

Display:

EXTENSION YYY

To transfer an outside call to a **HL** partner:

- Press **HL** key. Call automatically placed on **Hold** and **Handsfree Intercom** call is established with Hotline partner.
- Announce call and hang up. Call transferred automatically to Hotline partner.

Display:

XX TRANS TO YYY

To signal your Hotline partner that a call is waiting:

- Press **HL** key. Hotline partner will hear 2-beeps and **HLD/CNF** key flashes fast.
- Hang up for call to ring your partner when your partner's telephone is idle.
- Do not hang up to announce call.

Display:

XX TRANS TO YYY

To answer a Call Waiting signal from your Hotline partner:

- Press **HLD/CNF** key to place the first call on **Hold** (if **CO** call). Speak **Handsfree** to Hotline partner.

Display:

EXTENSION YYY

INTERCOM

To place an Intercom call:

- Lift handset (or press **HF** key).
- Press **LNT** key.
- Wait for dial tone. Dial station number.

Display:

EXTENSION YYY

The called party (if a key telephone) can automatically communicate with you **Handsfree**, unless **Forced Intercom Ringing** is enabled on a system-wide basis. **Single Line** (2500 type) and **One Button** telephones will ring.

If the called station cannot be reached, one of the following displays will appear:

Display:

WAITING FOR YYY

Display: YYY NOT EXIST

To answer a call privately, or a call that is ringing:

- *Lift handset.*

Display: YYY DND

Display: EXT YYY CALLING

To determine your station number (telephone must be idle):

- *Press the "T" key on the dial pad.*

If you want the dialed key telephone to ring:

- *Lift handset (or press HF key).*
- *Press INT key.*
- *Dial 1.*
- *Dial station number (301-348).*

Display: THIS IS EXT YYY

Display: RINGING YYY

LAST NUMBER REDIAL

The last outside number dialed is automatically stored in memory and can be redialed.

To redial the last number on a non-display telephone:

- *Lift handset (or press HF key).*
- *Press Line key used for original call. Listen for dial tone.*
- *Press Line key again.*[†]

OR

- *Lift handset*
- *Press INT key.*
- *Dial 830.*

Display: LINE XX

Display: DIGITS

[†] When the line used for the original call is busy, use another line in the same group. The attendant can provide you with information on line groupings.

To redial the last outside number (on display telephones only):

- *Lift handset (or press HF key).*
- *Press Line key.*

Display: FORCED RING ON

To return the telephone to voice-announced Intercom calls (i.e., enable Handsfree Answerback):

- *Lift handset (or press HF key).*
- *Press INT key.*
- *Dial 718.*
- *Hang up.*

Display: FORCED RING OFF

A voice-announced Intercom call coming into your telephone is indicated by 3 short beeps and a flashing HF key.

To answer an Intercom call Handsfree:

- *Do not press any keys.*
- *Answer announcement.*

Display:

LINE XX

- Press REDIAL key.

Display:

DIGITS

OR

- Press the Line key again.

LINE QUEUING

To queue (wait your turn) for an outside line when the line needed is busy:

- Press desired Line key.
- Press C.BACK key.

The telephone will ring and the Line key will flash when the line is available.

Display:

CALL BACK CO XX

To respond to a Line Queue signal:

- Lift handset (or press HF key).
- Listen for dial tone.
- Dial number.

MESSAGE WAITING

If a Four Button or Multibutton station is called and is unanswered, a Message Waiting indication (a tone and a flashing MSG.WAIT key) may be left, signaling the station user that a call is to be returned.

To leave a Message Waiting indication:

- Press MSG.WAIT key. Key flashes at called station.
- Hang up.

The MSG.WAIT key on the called telephone will flash, indicating that a message is waiting. The called party will hear a tone after 10 seconds, each time the station goes idle, until the Message Waiting indication is answered.

Display:

MSG FROM EXT YYY

To respond to a Message Waiting indication:

- Lift handset (or press HF key).
- Press flashing MSG.WAIT key.

Display:

EXTENSION YYY

The station which placed the Message Waiting indication is automatically signaled.

Display:

EXT YYY CALLING

To cancel a Message Waiting signal:

- Do not lift handset (or press HF key).
- Press MSG.WAIT key.
- Continue to press MSG.WAIT key until all Message Waiting indications are canceled. Key will extinguish.

MICROPHONE MUTE

Microphone Mute allows you to turn off the microphone while on a Handsfree call. This prevents the other party from hearing conversations in your office or work area.

To mute the microphone:

- Press MIC MUTE key while in Handsfree mode. Key flashes. Microphone turned off.

To return to HF conversation:

- Press MIC MUTE key again. Key stops flashing.

MONITOR

Telephones without the Handsfree feature are equipped with a Monitor (MON) key. Using the Monitor feature, you can dial and monitor the progress of an outside call without lifting the handset. You can also monitor an outside call while waiting for the called party to take your call off Hold.

To dial an outside number:

- Press MON key.
- Select a line.
- Dial desired number.
- Lift handset to speak to the called party.

To monitor an established outside call:

- Press MON key.
- Hang up.
- When the called party returns to the telephone, lift the handset to speak.

MUSIC ON HOLD/BACKGROUND MUSIC

Music On Hold (MOH) and Background Music (BGM) may be connected to your system. If installed, BGM is provided through the speaker in your telephone and is controlled by the left volume control thumbwheel. The HLD/CNF key is pressed to turn BGM on and off. BGM can also be broadcast over external paging equipment. MOH provides music to outside calls which have been placed on Hold. If you have a display telephone, BGM volume is controlled by the VOL UP and VOL DN keys.

NIGHT SERVICE

The lines that you can answer and place calls on may be assigned differently during off hours (i.e., when the system is in the night mode). Split Ringing allows complete flexibility when determining CO line assignments to your telephone. Check with your attendant to determine which lines are available to you when the system is in the night mode.

Assigned Night Answer

Assigned Night Answer (ANA) automatically transfers incoming ringing to specific stations when the system is in the night mode. Stations which do not receive line ringing and incoming access during day hours can be programmed for Assigned Night Answer. Assigned Night Answer must be individually programmed for each station.

To answer a night mode call ringing at your telephone:

- Lift handset.
- Press flashing line key.

Universal Night Answer

When the system is in the night mode, Universal Night Answer (UNA) allows calls which ring the external paging equipment or alerting device to be answered at designated stations. Stations which do not receive line ringing and incoming access during night hours (i.e., ANA) can be programmed for Universal Night Answer. Universal Night Answer must be individually programmed for each line and for each station.

To answer a night mode call ringing over the Paging system or external alerting device:

- Lift handset.
- Press flashing line key.
- OR
- Lift handset.
- Press INT key.
- Dial 69.

PAGING

All Call Page will page the whole system. Zone Page will page selected areas.

All Call Page

To make an All Call Page:

- Lift handset (or press HF key).
 - Press PAGE key.
 - Make announcement.
 - Hang up.
- OR
- Lift handset (or press HF key).
 - Press ENT key.
 - Dial 60.

Display:

60

- Make announcement.
- Hang up.

Zone Page

To make a Zone Page:

- Lift handset (or press HF key).
- Press INT key. Listen for dial tone.
- Dial zone (61-67).

Display:

61

through

Display:

67

- Make announcement.
- Hang up.

PLACING A CALL

To place an outside call:

- Lift handset (or press HF key).
- Press Line key (1-16).

Display:

LINE XX

- Wait for dial tone. Dial telephone number.

Display:

DIGITS

To display duration of a call while on an outside call:

- Press VOL UP key.

Display:

TIMER HR-MN

HR designates hours (00-99) and MN designates minutes (00-99).

To return to the date and time display:

- Press VOL DN key.

Display:

DATE AND TIME

To preselect a line:

- Press Line key (1-16) before lifting handset or pressing HF key.

Display:

LINE XX

- Lift handset (or press HF key).

PULSE TO TONE CONVERSION

You can change the signaling mode your telephone uses to dial on CO lines from pulse (DP) to tone (DTMF). To convert dialed digits from pulse to tone:

- *Lift handset (or press HF key).*
- *Press line key.*
- *Dial *.*
- *Dial number.*

The * may be entered at any point in the dialing sequence. The digits preceding the * are dialed as pulse digits. The digits succeeding the * are dialed as tone digits. The telephone reverts to pulse dialing as soon as you hang up.

SAVE

The SAVE feature stores a frequently called number for automatic dialing at a later time.

To SAVE a number:

- *Lift handset (or press HF key).*
- *Select outgoing Line key.*
- *Dial number.*
- *Press SAVE key after digits are dialed or while engaged on a call.*

Display:

NUMBER SAVED

- *Hang up.*

To dial a number stored with the SAVE key:

- *Lift handset (or press HF key).*
- *Press Line key.*
- *Press SAVE key.*

NOTE: The feature is available on display telephones only.

SPEED DIAL

The System utilizes two types of memory dialing: Station Speed Dial and System Speed Dial.

Speed Dial permits either the attendant (System and Station Speed Dial) or any telephone user (Station Speed Dial only) to store frequently used telephone numbers for easy future access. Each bin can store a maximum of 16 digits, including directives and chaining commands. Bins can be chained together to accommodate numbers greater than 16 digits.

Station Speed Dial

A station can be programmed for individual speed dialing by using the first 16 keys as bin storage locations. The station must be idle during Speed Dial programming. Each bin can store one telephone number, with a maximum of 16 digits.

To store Station Speed Dial numbers:

- *Do not lift handset (or press HF key).*
- *Press OUT/MEM key. Key flashes.*

Display:

PROGRAM MEMORY

- *Press bin (1-16) where number is to be stored. Key flashes.*

Display:

NUMBER TO BIN XX

- *Dial number to be stored.*

Display:

DIGITS

- *Press Bin key again. Bin key and OUT/MEM key stop flashing.*

Display:

PROGRAM COMPLETE

To dial Station Speed Dial numbers:

- Lift handset (or press HF key).
- Select a line.

Display:

LINE XX

- Press OUT/MEM key.
- Press bin (1-16).

Display:

LINE XX

Display:

DIGITS

Chaining

To dial a Speed Dial number with a manually-dialed number:

- Wait for Speed Dialing to finish.
- Dial second number.

Manual Chaining

To manually chain Station Speed dial numbers (as part of the same call):

- Lift handset (or press HF key).
- Select a line.
- Press OUT/MEM key.
- Press bin keys in the order they should be dialed.

To manually chain a Station Speed Dial bin with a System Speed Dial bin:

- Lift handset (or press HF key).
- Press LNT key.
- Dial 8 *.
- Dial bin number (01-16 or 31-80) or press bin key (1-16).
- Continue entering bin numbers or pressing bin keys (1-16) until the last bin in the chain is selected.
- Dial *.

To manually chain a Station Speed Dial bin with a System Speed Dial bin on a line that you designate:

- Lift handset (or press HF key).
- Press line key.
- Press OUT/MEM key.
- Dial *.
- Dial system bin number (31-80) or press station bin key (1-16).
- Continue entering bin numbers (31-80) or pressing bin keys (1-16) until the last bin in the chain is selected.
- Dial *.

Automatic Chaining

A Station Speed Dial bin may be automatically chained to a second System or Station Speed Dial bin. The number in the second bin will be automatically dialed after the first bin dials out. The second number will always be dialed as part of the first call. The command for chaining is entered as part of the Speed Dial number.

To automatically chain Speed Dial bins:

- Dial number into bin being programmed.
- Dial *.
- Dial number of bin (01-16 or 31-80) to which bin being programmed should be chained.
- Press bin key to complete programming sequence.
- Store number in second bin (i.e., bin to which first number is chained).

To access chained numbers:

- Dial first bin location.

Speed Dial Directives

Speed Dial Directives may be programmed into Speed Dial Bins to increase the flexibility of Speed Dialing. Each character in the directive is counted as a digit. If the directive is to be the first entry in a bin, it must be preceded by an additional *.

Directive *88 - DP to DTMF Conversion

The *88 directive is used to change the dialing mode of a Speed Dial number from pulse (DP) to tone (DTMF). The digits preceding the *88 are dialed as DP digits. The digits succeeding the *88 are dialed as DTMF digits. This directive is useful if your system is in a DP area and you have OCCs which require DTMF.

For example, when using a bin containing the digits 1203 *889262000, the digits 1203 will be Dial Pulsed and the digits 9262000 will dial out as DTMF tones.

Directives *89 and *90

The directives *89 and *90 are used to designate the beginning and end of Account Codes. These directives assure that Account Codes will not be dialed as digits and will be properly recorded on the SMDR.

For example, a bin programmed with 9262000 *89432 *90 will dial out 9262000 and automatically assign 432 as the Account Code.

Directive *91 - Display Telephone Microphone Off

If a Speed Dial number will normally be followed by a manually dialed number, enter the directive *91 as the last entry in the bin. This directive turns off the display telephone Handsfree microphone for 15 seconds, assuring correct manual dialing. If the directive *91 is not programmed, background noise through the display telephone microphone may cause the system to misinterpret the actual dialed digits.

For example, if the Speed Dial number 926200045451 accesses an Other Common Carrier (OCC), and manual dialing is desired after OCC dial tone is returned, program a bin with 926200045451 *91. When a display telephone uses this bin, the microphone will be muted for 15 seconds after the last digit dials out. This assures correct manual dialing.

Directive *92 - Display Telephone Microphone On

This directive cancels the directive *91. If you wish to chain a station bin ending in *91 to another station bin, program *92 as the first entry in the second bin. The Handsfree microphone will be enabled as soon as the second bin dials out.

For example, assume System Speed Dial bin 850 (containing 926200045451 *91) is to be chained to Station Speed Dial bin 01 (containing *928888000). After bin 850 dials out, the display telephone microphone is turned off. When the system sees the directive *92, the microphone is turned back on as soon as Station Speed Dial bin 01 dials out. If the *92 directive was not entered into station bin 01, the microphone could remain off for as long as ten seconds after bin 01 completed dialing.

Directives *93, *94 and *95 - Pause

These directives are used to enter pauses into Speed Dial bins. The directive *93 enters one pause; *94 enters two pauses; *95 enters three pauses. The duration of the pause is programmed during system installation.

Pauses may be entered when the system is installed behind a PBX. For example, if the PBX access code for an outside line is 9, and the number to be Speed Dialed is 9262000, program the bin with 9 *939262000. The system will pause after the first 9 is dialed, and then continue dialing the rest of the Speed Dial number. The pause may be necessary to allow the PBX time to seize the outside line.

System Speed Dial

Up to 50 frequently dialed numbers can be programmed into system memory by the attendant and are available to every station.

To dial System Speed Dial numbers:

- Lift handset (or press HF key).
- Press INT key.
- Dial desired code (831-880).

Display:

LINE XX

Display:

DIGITS

TRANSFER

You can transfer an incoming call to another station by one of two methods: Unscreened (Unannounced) or Screened (Announced):

Unscreened (Unannounced) Transfer

To make an Unscreened Transfer:

- Press INT key.
- Dial station number (or press DSS key) to receive transfer.
- Hang up.

Display:

XX TRANS TO YYY

The call will ring at the station receiving the transfer. If the receiving party does not answer, the call will ring at the attendant's station.

Screened (Announced) Transfer

To make a Screened Transfer:

- Press INT key.
- Dial station number or press DSS key to receive transfer.

Display:

XX TRANS TO YYY

- Announce call.
- Hang up.

If the party does not wish to take the call:

- Do not hang up.
- Press the flashing Line key to return to the call.

Display:

LINE XX

To answer a Transfer:

- Press the fluttering Line key.

Display:

XX TRANS FROM YYY

VOLUME CONTROLS

Two volume control thumbwheels are located on the front edge of the telephone. The left thumbwheel is used to adjust the volume of the Page Receive, Splash Tone, Ring Tone and Background Music (BGM). The right thumbwheel controls the volume of incoming Handsfree Answerback conversations. To increase volume turn the thumbwheels counter-clockwise. On display telephones, volume is controlled by the VOL UP and VOL DN keys.

APPENDIX C
OPERATIONAL SPECIFICATION
FOR
EK-824/1232/1648 FOUR BUTTON KEY TELEPHONE

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FEATURES

ACCOUNT CODE CAPABILITY

Four button telephones can enter Account Code numbers, up to nine digits long. To assign codes after placing a call:

- Dial # (within six seconds).
- Dial account code number.
- Dial #.

To assign a code to a call in progress:

- Press HLD/CNF key. Call is placed on Hold.
- Dial 500. This assigns the account code to the line being used.

OR

- Dial line number (501-516), if a specific line is desired.
- Dial Account Code.
- Dial #.

To return to call:

- Press and release hookswitch.
- Dial *.

To use an Account Code with Station or System Speed Dial:

- Place Speed Dial call.
- After number has dialed out, dial # (within six seconds).
- Dial Account Code number.
- Dial #.

ALERT TONE / PRIVACY TONE

The Alert Tone signal reminds you that your telephone is in the Handsfree Answerback mode. This feature is used to prevent unauthorized monitoring of conversations in your office or work area. The Alert Tone signal is a single one-half second beep which repeats as long as your telephone is in the Handsfree Answerback mode. The length of time between Alert Tones is programmed during system installation.

ANSWERING A CALL

To answer any call:

- Lift handset.

BARGE IN

Barge In permits the attendant to intrude on your established calls. Four beeps will indicate that a Barge In has been initiated. Following a four second delay, the attendant will be able to enter your conversation.

CALLBACK

A Callback request can be left at any busy station, except for the attendant.

To leave a Callback request:

- Press MW/ CB key. Key flashes momentarily.
- Hang up.

When the busy party becomes available, your telephone will ring and the MW/ CB key will flash.

To respond to a Callback request:

- Lift handset. MW/ CB key will extinguish.

CALL WAITING, CO CALL

When busy on another call, you may receive a signal that an outside (CO) call is waiting to be answered. This call can be a call ringing into your station or a call transferred from another station. The CO Call Waiting indication is a double beep.

To answer a CO Call Waiting signal (if busy on an Intercom call):

- *Press and release hookswitch. Initial call terminated. You will be connected to the waiting call.*

To answer a CO Call Waiting signal (if busy on another CO call):

- *Press HLD/CNF key (to put initial CO call on Hold).*
- *Press and release hookswitch to be connected to the waiting call.*

To return to the initial CO call on Hold:

- *Press HLD/CNF key. Second call put on Hold.*
 - *Dial *.*
- OR
- *Hang up. Second call terminated.*
 - *Lift handset, dial * to be connected to initial call.*

CALL WAITING, INTERNAL

Internal Call Waiting provides your station, when you are busy on another call, with an indication that an Internal call is waiting to be answered. The Internal Call Waiting signal is a single beep and flashing HLD/CNF key if the call is from another station; two beeps and flashing HLD/CNF key if the call is from the attendant.

To answer an Internal Call Waiting signal when busy on an internal call:

- *Press HLD/CNF.*

To answer an Internal Call Waiting signal when busy on a CO call:

- *If you wish to terminate first call, hang up. Waiting call connected.*
- OR
- *If you wish to place first call on Hold, press HLD/CNF key. You will be automatically connected to waiting call.*
 - *To return to CO call placed on Hold, press and release hookswitch and dial *. Intercom call is terminated.*

CONFERENCE

Conference permits a three-way telephone conversation. There are two types of conference: Add-On Conference and Line Conference.

Add-On Conference

To add an internal party to an outside call:

- *Press PR/RL key. Outside call is placed on Hold.*
- *Dial number of station to be included.*
- *Announce conference.*
- *Press PR/RL key. Invited party has ten seconds to join conference.*

To join an Add-On Conference when invited:

- *Press PR/RL key.*

Line Conference

To conference two external lines:

- *Press HLD/CNF key. First call is placed on Hold.*
- *Establish second call on another line.*
- *Press HLD/CNF key. Second call is placed on Hold.*
- *Press HLD/CNF key again. You are connected to conference.*

EQUAL ACCESS COMPATIBILITY

Equal Access allows the primary carrier to be selected for toll calls. This means that normal long distance calls can be automatically routed onto a selected service, such as MCI or SPENT, instead of a Direct Distance Dialing (DDD) line. If your system is in the Equal Access area, the primary carrier selection is done during installation and does not affect the way you dial long distance calls.

Equal Access also allows you to dial out on up to ten additional carriers. These services are accessed by dialing ten, the carrier's dedicated three-digit code, followed by the area code and the telephone number. The attendant can provide information on these codes, if applicable to your system.

HANDSFREE ANSWERBACK

Handsfree Answerback allows Intercom calls to be answered using the speaker and microphone in the telephone, instead of the handset. Intercom calls to multibutton and four button telephones are normally received in the Handsfree Answerback mode. Handsfree Answerback cannot occur if Forced Intercom Ringing is enabled for the system or the call was placed using the leading 1.

To cancel Handsfree Answerback (i.e., all incoming Intercom calls will ring):

- *Lift handset.*
- *Dial 777.*
- *Hang up.*

To enable Handsfree Answerback (if you have canceled it):

- *Lift handset.*
- *Dial 778.*
- *Hang up.*

HOLD

To place an outside call on Hold:

- *Press HLD CNF key.*
- *Hang up.*

To return to the call:

- *Lift handset.*
- *Dial *.*

NOTE: If call is left on Hold longer than the programmed period, the call will re-ring at your station. If still unanswered, it will ring at the attendant's station.

You may be able to answer a call on Hold (or ringing) at another station. To answer this type of call:

- *Lift handset.*
- *Dial = =.*
- *Dial line number (01-16) of call on Hold.*

INTERCOM

To place an Intercom call:

- *Lift handset.*
 - *Dial station number.*
- OR*
- *Press MON key.*
 - *Dial station number.*
 - *Lift handset if party answers.*

If Forced Intercom Ringing is enabled, all Intercom calls placed will ring. This is programmed during installation. Normally, all calls placed to multibutton and four button telephones will be connected Handsfree.

To place an Intercom call that will ring (if Forced Intercom Ringing is disabled):

- *Dial 1 before station number.*

LAST NUMBER REDIAL

The last outside telephone number you dial is stored so that you can redial it easily if you receive a busy signal or no one answers.

To redial the last number:

- *Lift handset.*
- *Dial 830.*

LINE QUEUING

When the outside line you want is busy, you can have the system signal you when it is available.

To queue an outside line:

- *Dial #.*
- *Dial 01-16 to select line.*
- *Press MW/CB key.*
- *MW/CB LED flashes.*
- *Hang up.*

When the desired line becomes idle, your station will ring.

To access the line:

- *Lift handset.*

MESSAGE WAITING

A Message Waiting indication can be left at a called station where there is no answer.

If you have made an internal call and there is no answer:

- *Press MW/CB key.*
- *Hang up.*

The station given a Message Waiting signal will have a flashing MSG.WAIT key (on a Multibutton Key Telephone) or MW/CB key (on a four button telephone) and will emit a tone after ten seconds, each time the station goes idle.

To respond to a Message Waiting indication at your telephone:

- *Lift handset.*
- *Press MW/CB key.*

The station leaving the Message Waiting is automatically signaled. If the MW/CB key continues to flash after the first call is completed, then another message is still waiting.

To answer succeeding Message Waiting indications:

- *Hang up.*
- *Lift handset.*
- *Press MW/CB key.*

You can also cancel a Message Waiting signal at your telephone without calling the person back.

To cancel a Message Waiting indication:

- *Do not lift handset.*
- *Press MW/CB key.*

If the key continues to flash, press it until the flashing stops.

MONITOR

Monitor allows you to dial and listen to the progress of a call without lifting the handset. This feature is also useful to listen to your call if it has been placed on Hold by the outside party. Monitor requires that you lift the handset to speak.

To activate Monitor:

- *Press MON key.*
- *Lift handset to speak.*

MUSIC ON HOLD/BACKGROUND MUSIC

Music On Hold (MOH) and Background Music may be connected to your system. If installed, BGM is provided through the speaker in your telephone and is controlled by the left volume control thumbwheel. The HLD/CNF key is pressed to turn BGM on and off. BGM can also be broadcast over external paging equipment. MOH provides music to outside calls which have been placed on Hold.

NIGHT SERVICE

Assigned Night Answer

Assigned Night Answer (ANA) automatically transfers incoming ringing to specific stations when the system is in the night mode. Stations which do not receive line ringing and incoming access during day hours can be programmed for Assigned Night Answer. Assigned Night Answer must be individually programmed for each station.

To answer a night mode call ringing at your telephone:

- *Lift handset.*

Universal Night Answer

When the system is in the night mode, Universal Night Answer (UNA) allows calls which ring the external paging equipment or alerting device to be answered at designated stations. Stations which do not receive line ringing and incoming access during night hours (i.e., ANA) can be programmed for Universal Night Answer. Universal Night Answer must be individually programmed for each line and for each station.

To answer a night mode call ringing over the Paging system or external alerting device:

- *Lift handset.*
- *Dial 69.*

PAGING

You can use your telephone to page telephones in the system that are equipped with speakers. If you dial 60, then you page all telephones (All Call). You can page selected zones by dialing the zone number (61-67).

To initiate a Page:

- *Lift handset.*
- *Dial 60 (All Call), or dial zone number (61-67).*
- *Make announcement.*
- *Hang up.*

PLACING A CALL

To place an outside call:

- *Lift handset.*
- *Dial #.*
- *Dial desired line number (01-16).*
- *Dial telephone number.*

OR

- *Lift handset.*
- *Dial 9 and the telephone number.*

When 9 is dialed, the system will search for a line in a group assigned during programming, starting with the highest numbered line and moving backwards until an available line is reached.

PULSE TO TONE CONVERSION

You can change the signaling mode your telephone uses to dial on CO lines from pulse (DP) to tone (DTMF). To convert dialed digits from pulse to tone:

- *Lift handset.*
- *Select outside line (by dialing 9 or # and the line number).*
- *Dial *.*
- *Dial number.*

The * may be entered at any point in the dialing sequence. The digits preceding the * are dialed as pulse digits. The digits succeeding the * are dialed as tone digits. The telephone reverts to pulse dialing as soon as you hang up.

SPEED DIAL

You can dial frequently used telephone numbers by using special Speed Dial codes.

Station Speed Dial

You can store up to 16 frequently dialed numbers. These numbers can have up to 16 digits (including directives and chaining commands).

To store Station Speed Dial numbers:

- *Lift handset.*
- *Dial # 8.*
- *Dial line number (01 to 16).*
- *Dial storage location (01 to 16).*
- *Dial number.*
- *Dial #. You will hear a beep tone.*

To use Station Speed dial:

- *Lift handset.*
- *Dial 8 plus storage location (01 to 16).*

System Speed Dial

The attendant can store up to 50 frequently dialed numbers. You may have access to these numbers. Check with your attendant for access and directory.

To dial a System Speed Dial number:

- *Lift handset.*
- *Dial code (331 to 380).*

Manual Chaining

To chain Speed Dial numbers:

- Lift handset.
- Dial 8.
- Dial *.
- Dial first Speed Dial bin (01-16 for Station Speed Dial, 31-80 for System Speed Dial).
- Dial second Speed Dial bin (01-16 for Station Speed Dial, 31-80 for System Speed Dial).
- Dial any other bins to be chained.
- Dial *.

Automatic Chaining

A Station Speed Dial bin may be automatically chained to a second System or Station Speed Dial bin. The number in the second bin will be automatically dialed after the first bin dials out. The second number will always be dialed as part of the first call. The command for chaining is entered as part of the Speed Dial number.

To automatically chain Speed Dial bins:

- Dial number into bin being programmed.
- Dial *.
- Dial number of bin (01-16 or 31-80) to which bin being programmed should be chained.
- Dial # to complete programming first bin.
- Store number in second bin (i.e., bin to which first number is chained).

To access chained numbers:

- Dial first bin location (801-816).

NOTE: Any number of Station Speed dial bins may be chained (up to the maximum of 16).

Speed Dial Directives

Speed Dial Directives may be entered into Speed Dial Bins to increase the flexibility of Speed Dialing. Each character in the directive is counted as a digit. If the directive is to be the first entry in a bin, it must be preceded by an additional *

Directive *88-DP to DTMF Conversion

The *88 directive is used to change the dialing mode of a Speed Dial number from pulse (DP) to tone (DTMF). The digits preceding the *88 are dialed as DP digits. The digits succeeding the *88 are dialed as DTMF digits. This directive is useful if your system is in a DP area and you have OCCs which require DTMF.

For example, when using a bin containing the digits 1203 *88 9262000, the digits 1203 will be Dial Pulsed and the digits 9262000 will dial out as DTMF tones.

Directives *89 and *90-Account Codes

The directives *89 and *90 are used to designate the beginning and end of Account Codes. These directives assure that Account Codes will not be dialed as digits and will be properly recorded on the SMDR.

For example, a bin programmed with 9262000 *89432 *90 will dial out 9262000 and automatically assign 432 as the Account Code.

Directives *93, *94 and *95-Pause

These directives are used to enter pauses into Speed Dial bins. The directive *93 enters one pause; *94 enters two pauses; *95 enters three pauses. The duration of the pause is programmed during system installation.

Pauses may be entered when the system is installed behind a PBX. For example, if the PBX access code for an outside line is 9, and the number to be Speed Dialed is 9262000, program the bin with 9 *939262000. The system will pause after the first 9 is dialed, and then continue dialing the rest of the Speed Dial number. The pause may be necessary to allow the PBX time to seize the outside line.

SPLIT

Split allows you to alternate (split) between two calls that you have placed on Hold. If you place more than two calls on Hold, Split will alternate between the last two calls that you placed on Hold.

To initiate Split:

- Establish first call.
- Place first call on Hold.
- Establish second call.
- Press HLD/CNF and dial * to alternate between calls.

TRANSFER

Unscreened Transfer

To Transfer a call Unscreened (unannounced):

- Press HLD/CNF key.
- Dial station number.
- Hang up. Call is transferred.

If the call is unanswered, it will be transferred to the attendant.

Screened Transfer

If you wish to make a Screened (voice-announced) Transfer, do not hang up after dialing the station number. You will be connected to the station, and may speak to the person to whom you are transferring the call. As soon as you hang up the call will be transferred.

You can return to the call if the called party does not wish to accept the transfer.

If the called party responds to your announcement Handsfree:

- Press HLD/CNF key.
- Dial *.

If the called party responds to your announcement using the handset and hangs up before you can return to the call:

- Press and release hookswitch.
- Dial *.

If you are on another call when a call is transferred to your station, your station will be signaled with a CO Call Waiting indication. If you hang up your first call, the transferred call will ring your station.

VOLUME CONTROLS

Two volume control thumbwheels are located on the front edge of the telephone. The left thumbwheel is used to adjust the volume of the Page Receive, Splash Tone, Ring Tone and Background Music (BGM). The right thumbwheel controls the volume of incoming Handsfree Answerback conversations. To increase volume turn the thumbwheels counterclockwise.

APPENDIX D
OPERATIONAL SPECIFICATION
FOR
EK-824/1232/1648 SINGLE LINE (2500 TYPE) TELEPHONE

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CALL WAITING, CO CALL	D-2	PAGING	D-5
CALL WAITING, INTERNAL	D-3	PLACING A CALL	D-5
CONFERENCE (ADD-ON)	D-3	PULSE TO TONE CONVERSION	D-5
EQUAL ACCESS COMPATIBILITY	D-3	SPEED DIAL	D-6
HOLD	D-3	SPLIT	D-7
		TRANSFER	D-7

FEATURES

ACCOUNT CODE CAPABILITY

Single line telephones can enter Account Code numbers, of up to nine digits.

To use with System and Station Speed Dial:

- *Place Speed Dial call.*
- *Wait until Speed Dialing is completed.*
- *Dial # (within six seconds).*
- *Dial Account Code number.*
- *Dial #.*

To use with manual dial:

- *Lift handset.*
- *Dial 9 or #01-#16 for outside line.*
- *Dial number.*
- *Dial # (within six seconds).*
- *Dial Account Code number.*
- *Dial #.*

To enter Account Code on incoming calls or an outside call in progress:

- *Press and release hookswitch.[†]*
- *Dial 500. This will assign the Account Code to the line being used. If station wants to assign an Account Code number to a specific line, the user may dial 501-516 to assign to lines 1-16.*
- *Enter Account Code number.*
- *Dial #.*

To return to the call:

- *Press and release hookswitch.*
- *Dial *.*

[†] The hookswitch must be pressed for approximately 1 second.

ANSWERING A CALL

To answer a call:

- *Lift handset.*

BARGE IN

Barge In permits the attendant to intrude on your established calls. Four beeps will indicate that a Barge In has been initiated. Following a four second delay, the attendant will be able to enter your conversation.

CALL WAITING, CO CALL

When busy on another call, you may receive a signal that an outside (CO) call is waiting to be answered. This call can be a call ringing into your station or a call transferred from another station. The CO Call Waiting indication is a double beep.

To answer a CO Call Waiting signal (if busy on a CO call):

- *Put CO call on Hold.*
- *Hang up.*
- *When telephone rings, lift handset. You will be connected to the waiting CO call.*

To return to the initial CO call:

- *Press and release hookswitch.*
- *Dial *.*

Split can be used to alternate between the CO calls.

To answer a CO Call Waiting signal (if busy on an Intercom call):

- *Hang up. Initial Intercom call terminated.*
- *When telephone rings, lift handset. You will be connected to the waiting CO call.*

CALL WAITING, INTERNAL

Internal Call Waiting provides your station, when you are busy on another call, with an indication that an Internal call is waiting to be answered. The Internal Call Waiting signal is a single beep if the call is from another station; a double beep if the call is from the attendant.

To answer an Internal Call Waiting signal, when busy on an internal call:

- *Hang up. Initial call terminated.*
- *When telephone rings, lift handset. You will be connected to the waiting internal call.*

To answer an Internal Call Waiting signal, when busy on a CO call:

- *If you wish to terminate first call, hang up.*
- *When telephone rings, lift handset.*
OR
- *If you wish to place first call on Hold, press and release hookswitch, dial 2.*
- *Hang up. When telephone rings, lift handset. Waiting call connected.*

To return to CO call placed on Hold:

- *Press and release hookswitch and dial *. Intercom call is terminated.*

CONFERENCE (ADD-ON)

A single line telephone can enter an Add-On Conference when invited. Before an Add-On Conference can be established, the single line telephone must receive an Intercom call from the station initiating the conference. This call tells the single line telephone user which line the conference call is to be on.

To enter an Add-On Conference:

- *Lift handset to answer Intercom call.*
- *Press and release hookswitch.*
- *Dial ==.*
- *Dial the line number of the conference call (01-16).*

EQUAL ACCESS COMPATIBILITY

Equal Access allows the primary carrier to be selected for toll calls. This means that normal long distance calls can be automatically routed onto a selected service, such as MCI or SPRINT, instead of a Direct Distance Dialing (DDD) line. If your system is in the Equal Access area, the primary carrier selection is done during installation and does not affect the way you dial long distance calls.

Equal Access also allows you to dial out on up to ten additional carriers. These services are accessed by dialing ten, the carrier's dedicated three-digit code, followed by the area code and the telephone number. The attendant can provide information on these codes, if applicable to your system.

HOLD

To place a call on Hold:

- *Press and release hookswitch.*
- *Dial 2.*

To return to a call on Hold:

- *Press and release hookswitch.*
- *Dial *.*

You may be able to answer a call on Hold (or ringing) at another station.

To answer this type of call:

- *Press and release hookswitch.*
- *Dial #.*
- *Dial the line number (01-16).*

NOTE: If call is left on Hold longer than the programmed period, the call will re-ring at your station. If still unanswered, it will ring at the attendant's station.

INTERCOM

The Intercom feature is used to call another station in the telephone system.

To place an Intercom call:

- *Lift handset and listen for dial tone.*
- *Dial station number (301-348).*

To call attendant's station:

- *Lift handset and listen for dial tone.*
- *Dial 0.*

If another single line telephone is called, it will ring. If the station called is a multibutton or four button telephone, it will receive your call Handsfree, unless the system is programmed for Forced Intercom Ringing. If privacy is desired on your call to the multibutton station, you may ring the called station. The person you are calling must lift the handset to answer your call.

To ring a multibutton or four button telephone:

- *Lift handset and listen for dial tone.*
- *Dial 1. Dial station number (301-348).*

If distinctive ringing is enabled in your system, outside calls will ring with two short ring bursts followed by a 4.5 second pause. Intercom calls will ring with one 1.5 second ring burst followed by a 4.5 second pause. If distinctive ringing is disabled, Intercom and CO line ringing are identical (one 1.5 second ring burst followed by a 4.5 second pause).

To answer an Intercom call:

- *Lift handset.*

LAST NUMBER REDIAL

The last number dialed is placed in memory and can be redialed automatically.

To redial the last number:

- *Lift handset and listen for dial tone.*
- *Dial 830.*

NIGHT SERVICE

Assigned Night Answer

Assigned Night Answer (ANA) automatically transfers incoming ringing to specific stations when the system is in the night mode. Stations which do not receive line ringing and incoming access during day hours can be programmed for Assigned Night Answer. Assigned Night Answer must be individually programmed for each station.

To answer a night mode call ringing at your telephone:

- *Lift handset.*

Universal Night Answer

When the system is in the night mode, Universal Night Answer (UNA) allows calls which ring the external paging equipment or alerting device to be answered at designated stations. Stations which do not receive line ringing and incoming access during night hours (i.e., ANA) can be programmed for Universal Night Answer. Universal Night Answer must be individually programmed for each line and for each station.

To answer a night mode call ringing over the Paging system or external alerting device:

- *Lift handset.*
- *Dial 69.*

PAGING

All Call Page will page the entire system. Zone Page will page selected areas.

All Call Page

To make an All Call Page:

- *Lift handset and listen for dial tone.*
- *Dial 60.*
- *Make announcement.*
- *Hang up.*

Zone Page

To make a Zone Page:

- *Lift handset and listen for dial tone.*
- *Dial zone number (61-67).*
- *Make announcement.*
- *Hang up.*

PLACING A CALL

To place an outside call:

- *Lift handset and listen for dial tone.*
- *Dial 9. This will select an available line in a group specified during programming.*
- *Listen for CO dial tone.*
- *Dial number.*

OR

- *Lift handset and listen for dial tone.*
- *Dial # and the number of the line (01-16) to be accessed.*
- *Listen for CO dial tone.*
- *Dial number.*

NOTE: When # and the line number (01-16) is dialed, a line will be seized only if it is idle.

PULSE TO TONE CONVERSION

You can change the signaling mode your telephone uses to dial on CO lines from pulse (DP) to tone (DTMF). To convert dialed digits from pulse to tone:

- *Lift handset and listen for dial tone.*
- *Select outside line (by dialing 9 or # and the line number).*
- *Dial *.*
- *Dial number.*

The * may be entered at any point in the dialing sequence. The digits preceding the * are dialed as pulse digits. The digits succeeding the * are dialed as tone digits. The telephone reverts to pulse dialing as soon as you hang up.

SPEED DIAL

You can dial frequently used telephone numbers by using special Speed Dial codes.

Station Speed Dial

You can store up to 16 frequently dialed numbers. These numbers can have up to 16 digits (including directives and chaining commands).

To store Station Speed Dial numbers:

- *Lift handset and listen for dial tone.*
- *Dial = 8.*
- *Dial Line number (01 to 16).*
- *Dial storage location (01 to 16).*
- *Dial number.*
- *Dial =. You will hear a beep tone.*

To use Station Speed dial:

- *Lift handset.*
- *Dial 8 plus storage location (01 to 16).*

System Speed Dial

The attendant can store up to 50 frequently dialed numbers. Check with your attendant to see if you have access to these numbers.

To dial a System Speed Dial number:

- *Lift handset and listen for dial tone.*
- *Dial code (831 to 880).*

Manual Chaining

To chain Speed Dial numbers:

- *Lift handset.*
- *Dial 8.*
- *Dial *.*
- *Dial first Speed Dial bin (01-16 for Station Speed Dial, 31-80 for System Speed Dial).*
- *Dial second Speed Dial bin (01-16 for Station Speed Dial, 31-80 for System Speed Dial).*
- *Dial any other bins to be chained.*
- *Dial *.*

Automatic Chaining

A Station Speed Dial bin may be automatically chained to a second System or Station Speed Dial bin. The number in the second bin will be automatically dialed after the first bin dials out. The second number will always be dialed on the line accessed by the first bin. The command for chaining is entered as part of the Speed Dial number.

To automatically chain Speed Dial bins:

- *Dial number into bin being programmed.*
- *Dial *.*
- *Dial number of bin (01-16 or 31-80) to which bin being programmed should be chained.*
- *Dial = to complete programming.*
- *Hang up.*
- *Store number in second bin (i.e., bin to which first number is chained).*

To access chained numbers:

- *Dial first bin location (801-816).*

NOTE: Any number of Station Speed dial bins may be chained (up to the maximum of 16).

Speed Dial Directives

Speed Dial Directives may be entered into Speed Dial bins to increase the flexibility of Speed Dialing. Each character in the directive is counted as a digit. If the directive is to be the first entry in a bin, it must be preceded by an additional *.

Directive *88 - DP to DTMF Conversion

The *88 directive is used to change the dialing mode of a Speed Dial number from pulse (DP) to tone (DTMF). The digits preceding the *88 are dialed as DP digits. The digits succeeding the *88 are dialed as DTMF digits. This directive is useful if your system is in a DP area and you have OCCs which require DTMF.

For example, when using a bin containing the digits 1203 *88 9262000, the digits 1203 will be Dial Pulsed and the digits 9262000 will dial out as DTMF tones.

Directives *89 and *90

The directives *89 and *90 are used to designate the beginning and end of Account Codes. These directives assure that Account Codes will not be dialed as digits and will be properly recorded on the SMDR.

For example, a bin programmed with 9262000 *89432 *90 will dial out 9262000 and automatically assign 432 as the Account Code.

Directives *93, *94 and *95 - Pause

These directives are used to enter pauses into Speed Dial bins. The directive *93 enters one pause; *94 enters two pauses; *95 enters three pauses. The duration of the pause is programmed during system installation.

Pauses may be entered when the system is installed behind a PBX. For example, if the PBX access code for an outside line is 9, and the number to be Speed Dialed is 9262000, program the bin with 9 *939262000. The system will pause after the first 9 is dialed, and then continue dialing the rest of the Speed Dial number. The pause may be necessary to allow the PBX time to seize the outside line.

SPLIT

Split allows you to alternate (split) between two calls that you have placed on Hold. If you place more than two calls on Hold, Split will alternate between the last two calls that you placed on Hold.

To initiate Split:

- Establish first call.
- Place first call on Hold.
- Establish second call.
- Place second call on Hold.
- Press and release hookswitch and dial * to alternate between calls.

TRANSFER

A call can be transferred to another station in the system. A transfer can be either Unscreened (Unannounced) or Screened (Announced). Outside calls can also be transferred to a station that is either idle or busy.

Unscreened (Unannounced) Transfer

To make an Unscreened (Unannounced) Transfer:

- Press and release hookswitch
- Dial station to receive transfer (301-348).
- Hang up.

If the party does not take the call, then the call rings at the attendant's station.

Screened (Announced) Transfer

To make a Screened (Announced) Transfer:

- *Press and release hookswitch*
- *Dial station to receive transfer (301-348).*
- *Announce call.*
- *If party wishes to receive transfer, hang up.*
- *If party does not wish to take the call, do not hang up.*
- *Press and release hookswitch.*
- *Dial *.*

When transferring party hangs up, the call is automatically transferred.

If, after transfer, the party does not take the call, it will ring at the attendant's station.

To receive a transferred call when your station is signaled:

- *Lift handset.*

If you wish to receive a Screened Transfer:

- *Remain on the line after the call is announced (call will be automatically connected).*

APPENDIX E
OPERATIONAL SPECIFICATION
FOR
EK-824/1232/1648 ONE BUTTON TELEPHONE

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FEATURES

ACCOUNT CODE CAPABILITY

One Button telephones can enter Account Code numbers, of up to nine digits.

To use with System and Station Speed Dial:

- *Place Speed Dial call.*
- *Wait until Speed Dialing is completed.*
- *Dial # (within six seconds).*
- *Dial Account Code number.*
- *Dial #.*

To use with manual dial:

- *Lift handset.*
- *Dial 9 or #01-#16 for outside line.*
- *Dial number.*
- *Dial # (within six seconds).*
- *Dial Account Code number.*
- *Dial #.*

To enter Account Code on incoming calls or an outside call in progress:

- *Press and release HOLD/TRANSFER bar.*
- *Dial 500. This will assign the Account Code to the line being used. If station wants to assign an Account Code number to a specific line, the user may dial 501-516 to assign to lines 1-16.*
- *Enter Account Code number.*
- *Dial #.*

To return to the call:

- *Press and release HOLD/TRANSFER bar.*
- *Dial *.*

ANSWERING A CALL

To answer a call:

- *Lift handset.*

BARGE IN

Barge In permits the attendant to intrude on your established calls. Four beeps will indicate that a Barge In has been initiated. Following a four second delay, the attendant will be able to enter your conversation.

CALL WAITING, CO CALL

When busy on another call, you may receive a signal that an outside (CO) call is waiting to be answered. This call can be a call ringing into your station or a call transferred from another station. The CO Call Waiting indication is a double beep.

To answer a CO Call Waiting signal (if busy on a CO call):

- *Put CO call on Hold.*
- *Hang up.*
- *When telephone rings, lift handset. You will be connected to the waiting CO call.*

To return to the initial CO call:

- *Press HOLD/TRANSFER bar.*
- *Dial *.*

Split can be used to alternate between the CO calls.

To answer a CO Call Waiting signal (if busy on an Intercom call):

- *Hang up. Initial Intercom call terminated.*
- *When telephone rings, lift handset. You will be connected to the waiting CO call.*

CALL WAITING. INTERNAL

Internal Call Waiting provides your station, when you are busy on another call, with an indication that an Internal call is waiting to be answered. The Internal Call Waiting signal is a single beep if the call is from another station; a double beep if the call is from the attendant.

To answer an Internal Call Waiting signal, when busy on an internal call:

- *Hang up. Initial call terminated.*
- *When telephone rings, lift handset. You will be connected to the waiting internal call.*

To answer an Internal Call Waiting signal, when busy on a CO call:

- *If you wish to terminate first call, hang up.*
- *When telephone rings, lift handset.*
OR
- *If you wish to place first call on Hold, press and release HOLD/TRANSFER bar, dial 2.*
- *Hang up. When telephone rings, lift handset. Waiting call connected.*

To return to CO call placed on Hold:

- *Press and release HOLD/TRANSFER bar and dial *. Intercom call is terminated.*

CONFERENCE (ADD-ON)

A One Button telephone can enter an Add-On Conference when invited. Before an Add-On Conference can be established, the One Button telephone must receive an Intercom call from the station initiating the conference. This call tells the One Button telephone user which line the conference call is to be on.

To enter an Add-On Conference:

- *Lift handset to answer Intercom call.*
- *Press and release HOLD/TRANSFER bar.*
- *Dial ==.*
- *Dial the line number of the conference call (01-16).*

EQUAL ACCESS COMPATIBILITY

Equal Access allows the primary carrier to be selected for toll calls. This means that normal long distance calls can be automatically routed onto a selected service, such as MCI or SPRINT, instead of a Direct Distance Dialing (DDD) line. If your system is in the Equal Access area, the primary carrier selection is done during installation and does not affect the way you dial long distance calls.

Equal Access also allows you to dial out on up to ten additional carriers. These services are accessed by dialing ten, the carrier's dedicated three-digit code, followed by the area code and the telephone number. The attendant can provide information on these codes, if applicable to your system.

HOLD

To place a call on Hold:

- *Press and release HOLD/TRANSFER bar.*
- *Dial 2.*

To return to a call on Hold:

- *Press and release HOLD/TRANSFER bar.*
- *Dial *.*

You may be able to answer a call on Hold (or ringing) at another station.

To answer this type of call:

- *Press and release HOLD/TRANSFER bar.*
- *Dial =.*
- *Dial the line number (01-16).*

NOTE: If call is left on Hold longer than the programmed period, the call will re-ring at your station. If still unanswered, it will ring at the attendant's station.

INTERCOM

The Intercom feature is used to call another station in the telephone system.

To place an Intercom call:

- *Lift handset and listen for dial tone.*
- *Dial station number (301-348).*

To call attendant's station:

- *Lift handset and listen for dial tone.*
- *Dial 0.*

If another One Button or single line telephone is called, it will ring. If the station called is a multibutton or four button telephone, it will receive your call Handsfree, unless the system is programmed for Forced Intercom Ringing. If privacy is desired on your call to the multibutton station, you may ring the called station. The person you are calling must lift the handset to answer your call.

To ring a multibutton or four button telephone:

- *Lift handset and listen for dial tone.*
- *Dial 1. Dial station number (301-348).*

If distinctive ringing is enabled in your system, outside calls will ring with two short ring bursts followed by a 4.5 second pause. Intercom calls will ring with one 1.5 second ring burst followed by a 4.5 second pause. If distinctive ringing is disabled, Intercom and CO line ringing are identical (one 1.5 second ring burst followed by a 4.5 second pause).

To answer an Intercom call:

- *Lift handset.*

LAST NUMBER REDIAL

The last number dialed is placed in memory and can be redialed automatically.

To redial the last number:

- *Lift handset and listen for dial tone.*
- *Dial 330.*

NIGHT SERVICE

Assigned Night Answer

Assigned Night Answer (ANA) automatically transfers incoming ringing to specific stations when the system is in the night mode. Stations which do not receive line ringing and incoming access during day hours can be programmed for Assigned Night Answer. Assigned Night Answer must be individually programmed for each station.

To answer a night mode call ringing at your telephone:

- *Lift handset.*

Universal Night Answer

When the system is in the night mode, Universal Night Answer (UNA) allows calls which ring the external paging equipment or alerting device to be answered at designated stations. Stations which do not receive line ringing and incoming access during night hours (i.e., ANA) can be programmed for Universal Night Answer. Universal Night Answer must be individually programmed for each line and for each station.

To answer a night mode call ringing over the Paging system or external alerting device::

- *Lift handset.*
- *Dial 69.*

PAGING

All Call Page will page the entire system. Zone Page will page selected areas.

All Call Page

To make an All Call Page:

- *Lift handset and listen for dial tone.*
- *Dial 60.*
- *Make announcement.*
- *Hang up.*

Zone Page

To make a Zone Page:

- *Lift handset and listen for dial tone.*
- *Dial zone number (61-67).*
- *Make announcement.*
- *Hang up.*

PLACING A CALL

To place an outside call:

- *Lift handset and listen for dial tone.*
 - *Dial 9. This will select an available line in a group specified during programming.*
 - *Listen for CO dial tone.*
 - *Dial number.*
- OR
- *Lift handset and listen for dial tone.*
 - *Dial # and the number of the line (01-16) to be accessed.*
 - *Listen for CO dial tone.*
 - *Dial number.*

NOTE: When # and the line number (01-16) are dialed, a line will be seized only if it is idle.

PULSE TO TONE CONVERSION

You can change the signaling mode your telephone uses to dial on CO lines from pulse (DP) to tone (DTMF). To convert dialed digits from pulse to tone:

- *Lift handset and listen for dial tone.*
- *Select outside line (by dialing 9 or = and the line number).*
- *Dial *.*
- *Dial number.*

The * may be entered at any point in the dialing sequence. The digits preceding the * are dialed as pulse digits. The digits succeeding the * are dialed as tone digits. The telephone reverts to pulse dialing as soon as you hang up.

SPEED DIAL

You can dial frequently used telephone numbers by using special Speed Dial codes.

Station Speed Dial

You can store up to 16 frequently dialed numbers. These numbers can have up to 16 digits (including directives and chaining commands).

To store Station Speed Dial numbers:

- *Lift handset and listen for dial tone.*
- *Dial # 8.*
- *Dial Line number (01 to 16).*
- *Dial storage location (01 to 16).*
- *Dial number.*
- *Dial =. You will hear a beep tone.*

To use Station Speed dial:

- *Lift handset.*
- *Dial # 8 plus storage location (01 to 16).*

System Speed Dial

The attendant can store up to 50 frequently dialed numbers. You may have access to these numbers, check with your attendant for access and directory.

To dial a System Speed Dial number:

- *Lift handset and listen for dial tone.*
- *Dial code (831 to 880).*

Manual Chaining

To chain Speed Dial numbers:

- *Lift handset.*
- *Dial 8.*
- *Dial *.*
- *Dial first Speed Dial bin (01-16 for Station Speed Dial, 31-80 for System Speed Dial).*
- *Dial second Speed Dial bin (01-16 for Station Speed Dial, 31-80 for System Speed Dial).*
- *Dial any other bins to be chained.*
- *Dial *.*

Automatic Chaining

A Station Speed Dial bin may be automatically chained to a second System or Station Speed Dial bin. The number in the second bin will be automatically dialed after the first bin dials out. The second number will always be dialed on the line accessed by the first bin. The command for chaining is entered as part of the Speed Dial number.

To automatically chain Speed Dial bins:

- *Dial number into bin being programmed.*
- *Dial *.*
- *Dial number of bin (01-16 or 31-80) to which bin being programmed should be chained.*
- *Dial # to complete programming.*
- *Hang up.*
- *Store number in second bin (i.e., to which first number is chained).*

To access chained numbers:

- *Dial first bin location (801-816).*

NOTE: Any number of Station Speed dial bins may be chained (up to the maximum of 16).

Speed Dial Directives

Speed Dial Directives may be entered into Speed Dial Bins to increase the flexibility of Speed Dialing. Each character in the directive is counted as a digit. If the directive is to be the first entry in a bin, it must be preceded by an additional *.

Directive *88 - DP to DTMF Conversion

The *88 directive is used to change the dialing mode of a Speed Dial number from pulse (DP) to tone (DTMF). The digits preceding the *88 are dialed as DP digits. The digits succeeding the *88 are dialed as DTMF digits. This directive is useful if your system is in a DP area and you have OCCs which require DTMF.

For example, when using a bin containing the digits 1203 *88 9262000, the digits 1203 will be Dial Pulsed and the digits 9262000 will dial out as DTMF tones.

Directives *89 and *90

The directives *89 and *90 are used to designate the beginning and end of Account Codes. These directives assure that Account Codes will not be dialed as digits and will be properly recorded on the SMDR.

For example, a bin programmed with 9262000 *89432 *90 will dial out 9262000 and automatically assign 432 as the Account Code.

Directives *93, *94 and *95 - Pause

These directives are used to enter pauses into Speed Dial bins. The directive *93 enters one pause; *94 enters two pauses; *95 enters three pauses. The duration of the pause is programmed during system installation.

Pauses may be entered when the system is installed behind a PBX. For example, if the PBX access code for an outside line is 9, and the number to be Speed Dialed is 9262000, program the bin with 9 *939262000. The system will pause after the first 9 is dialed, and then continue dialing the rest of the Speed Dial number. The pause may be necessary to allow the PBX time to seize the outside line.

SPLIT

Split allows you to alternate (split) between two calls that you have placed on Hold. If you place more than two calls on Hold, Split will alternate between the last two calls that you placed on Hold.

To initiate Split:

- *Establish first call.*
- *Place first call on Hold.*
- *Establish second call.*
- *Place second call on Hold.*
- *Press and release HOLD/TRANSFER bar and dial * to alternate between calls.*

TRANSFER

A call can be transferred to another station in the system. A transfer can be either Unscreened (Unannounced) or Screened (Announced). Outside calls can also be transferred to a station that is either idle or busy.

Unscreened (Unannounced) Transfer

To make an Unscreened (Unannounced) Transfer:

- *Press and release HOLD/TRANSFER bar.*
- *Dial station to receive transfer (301-348).*
- *Hang up.*

If the party does not take the call, then the call rings at the attendant's station.

Screened (Announced) Transfer

To make a Screened (Announced) Transfer:

- *Press and release HOLD/TRANSFER bar.*
- *Dial station to receive transfer (301-348).*
- *Announce call.*
- *If party wishes to receive transfer, hang up.*
- *If party does not wish to take the call, do not hang up.*
- *Press and release HOLD/TRANSFER bar.*
- *Dial *.*

When transferring party hangs up, the call is automatically transferred.

If, after transfer, the party does not take the call, it will ring at the attendant's station.

To receive a transferred call when your station is signaled:

- *Lift handset.*

If you wish to receive a Screened Transfer:

- *Remain on the line after the call is announced (call will be automatically connected).*

April 1985
Issue 1-

SYSTEM PRACTICE
Part No. 01003 LMG-F

APPENDIX F
OFF PREMISES EXTENSION
DESCRIPTION AND INSTALLATION MANUAL

OFF PREMISES EXTENSION DESCRIPTION AND INSTALLATION MANUAL

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4. INSTALLATION	7
5. CIRCUIT DESCRIPTION	18

1. GENERAL

1.01 The Off Premises Extension (OPX) Adaptor Printed Circuit Board (PCB), B-OPX-A (P/N 86043), enables a Class C OPX line supplied by the local telephone company to be connected to the system via a port on the B-8SLU-B PCB. This adaptor meets the requirements defined in FCC Facility Interface Code OL13C and EIA Specification 464-1. A telephone in a distant location connected to the system via the OPX Interface Circuit, will have access to all system features available to single line telephones. The B-OPX-A PCB requires ancillary equipment and additional connections.

1.02 The OPX equipment installed in a system can also be used to enhance the performance of a single line telephone assigned as an On Premises Extension (ONX). A single line telephone, assigned as an ONX, does not need to be modified with a T.E. Electronic Tone Ringer.

NOTE: The OPX must be installed by a certified technician.

Required Equipment

1.03 An OPX interface requires additional connections and the following equipment: B-OPX-A PCB, B-8SLU-B PCB, a 48V Power Supply, Ringing Generator and a 13 Card Rev. Serv. Unit (KSU) or a 6 Card KSU. The recommended units are the Tellabs 48V Power Supply, the Tellabs Ringing Generator and the ITT 13 Card KSU or the ITT 6 Card KSU. The 13 Card KSU allows for future expansion and is recommended for systems which may require tie-lines at a later date.

Each B-OPX-A PCB provides a port for one Off Premises Extension. The PCB is inserted into a standard 6 card or 13 Card KSU.

One B-8SLU-B PCB is required in the system KSU when an OPX is installed in the system. An B-8SLU-B PCB can serve up to 8 OPXs.

6 Card KSU and Power Supply

1.04 The 6 Card KSU is designed for wall mounting and holds a maximum of 6 B-OPX-A PCBs. These boards are inserted into the hinged shelf or rack (Figure 1). The 48V Power Supply and Ringing Generator are mounted inside the KSU cabinet (Figure 2). The shelf containing the PCBs is hinged so that it can be opened to provide access to two 50-pin connecting blocks. One block is split.

Functions of the connecting blocks when installing an OPX are as follows:

Block A--Contains connections from the B-8SLU-B PCB to the OPX extensions.

Block B--Contains internal wiring of the 6 Card KSU and requires no additional wiring.

Block C--Contains connections from the 48V Power Supply and Ringing Generator. Provides connections for tie-lines.

13 Card KSU and Power Supply

1.05 The 13 Card KSU is designed for wall mounting. Eight of the 13 card positions can be used for B-OPX-A PCBs (Figure 3). Remaining positions can be used to accommodate future tie-line applications. The 13 Card KSU is similar to the 6 Card KSU in that the Power Supply and Ringing Generator are mounted on the shelf (Figure 4). The 13 Card KSU contains four 50-pin plugs located on the back of the unit and a terminal block located on the front.

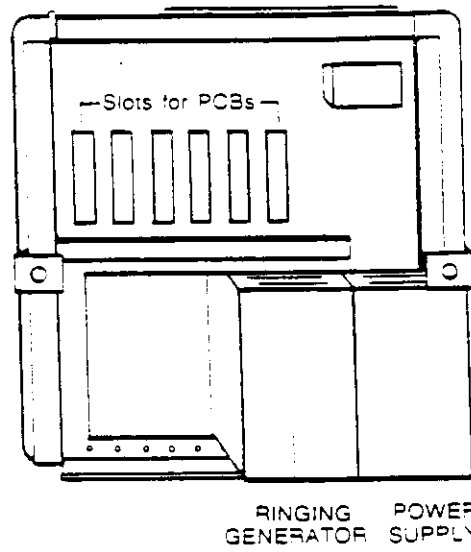


Figure 1 6 CARD KSU OUTSIDE VIEW

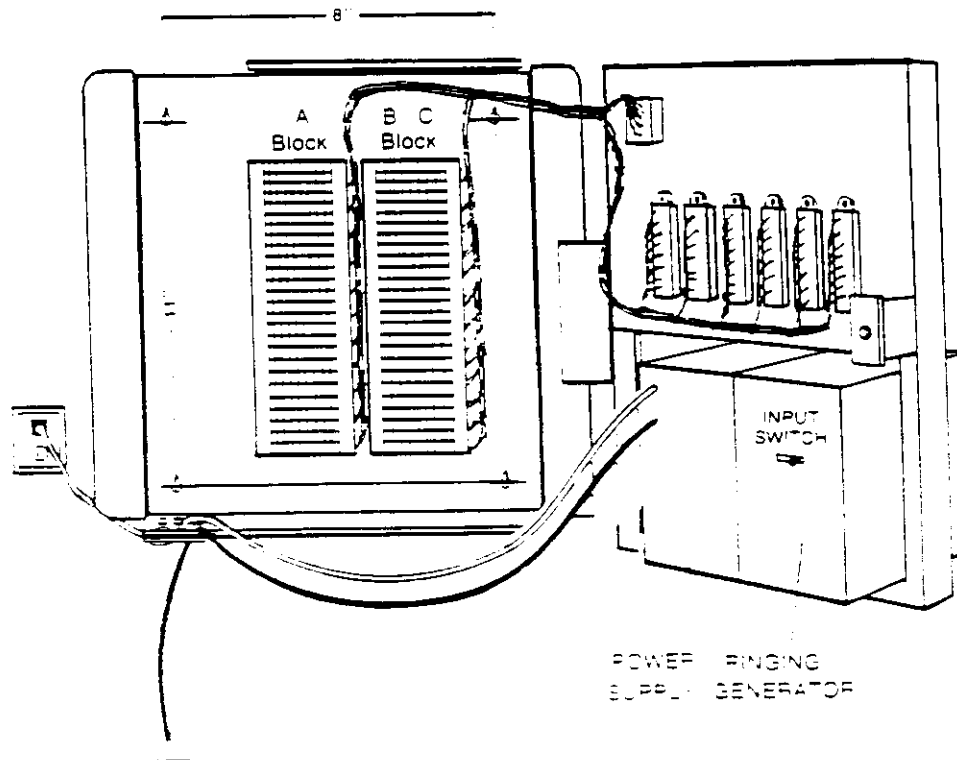


Figure 2 6 CARD KSU WITH HINGED SHELF OPENED

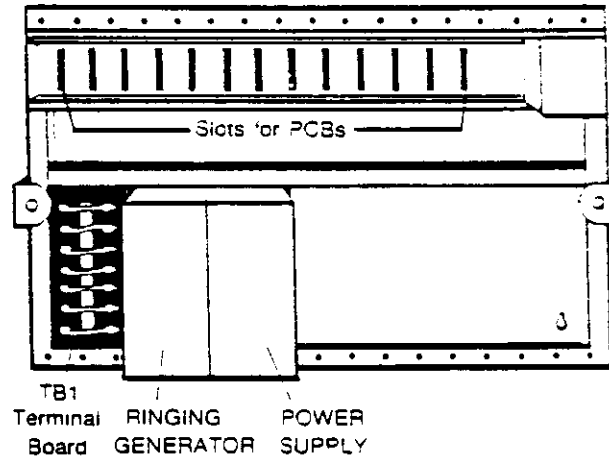


Figure 3 13 CARD KSU OUTSIDE VIEW

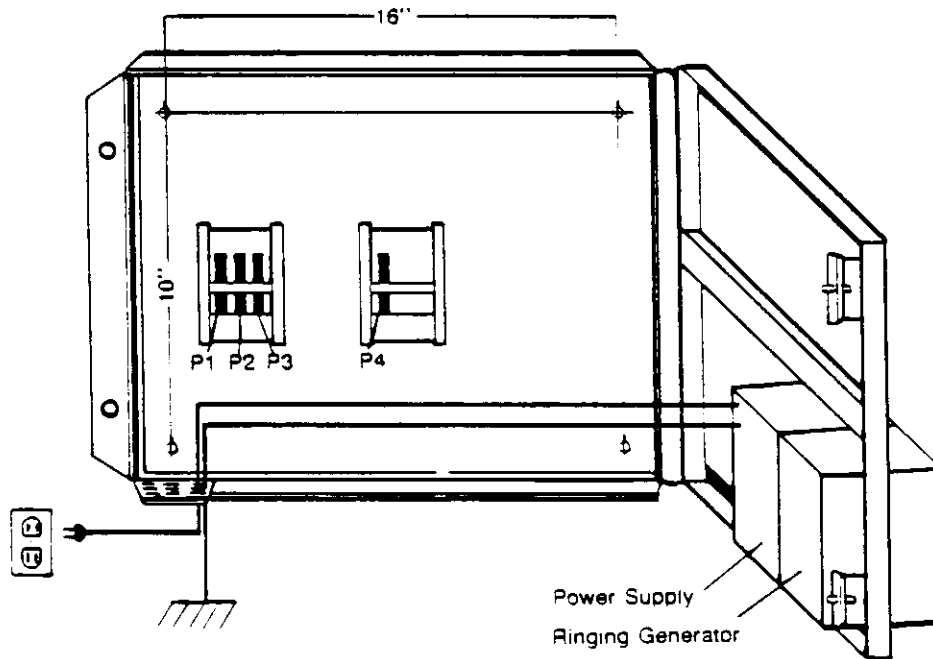


Figure 4 13 CARD KSU WITH HINGED SHELF OPENED

Assignments of the plugs when installing an OPX are as follows:
Plugs 1 & 2: used for connections from the BLSLU B PCB to the OPX extensions and from the OPX extensions to the telephones.

- Plug 3: Contains internal wiring and requires no additional wiring.
- Plug 4: Provides connections for Power Supply and ground to each station.

2. SPECIFICATIONS

- 2.01 Refer to Table 1 for technical specifications pertaining to the OPX.

3. FEATURES

3.01 The following paragraphs provide information on the features that are available to a single line telephone used as an OPX. Each feature paragraph provides a description of the feature. Table 2 shows the features that are available in each system. Instruction for use of the feature is contained in the appropriate system single line user's Guide. The following features are available:

Account Code	Intercom
Barge-In	Last Number Redial
Call Waiting	Paging
Central Office Call - Incoming	Park
Central Office Call - Outgoing	Speed Dia
Conference	Split
Directed Call Pick-Up	Transfer Restriction
Group Pick-Up	Transfer
Hold	Universal Night Answer

ACCOUNT CODE

3.02 If the system has been installed with a customer supplied printer, a record of all calls may be kept by assigning account codes of up to nine digits. Account codes are assigned at the telephone from which the calls are being placed. This feature is available from all telephones in the system.

BARGE-IN

3.03 Barge-In is a system programmable feature that permits designated extensions to override the OPX's Barge-In. If other specified extensions, when in use, are interrupted, the conversation in progress receives a Barge-In signal (a Barge-In tone) and then the voice of the extension being barge-in is being in. Extensions can be programmed to allow or disallow Barge-In. Unless the call is terminated by the party being barge-in, the Barge-In can release the Barge-In tone.

CAUTION: UNAUTHORIZED MONITORING OF CALLS USING THE BARGE-IN FEATURE MAY BE INTERPRETED AS AN INVASION OF PRIVACY.

CALL WAITING

3.04 Call Waiting is a system programmable feature which provides a busy station with an audible and visual indication that a call is waiting to be answered. The entire system may be programmed to allow or disallow Call Waiting signals. However, if signaling is allowed on a system wide basis, it may still be disallowed on a station wide basis. All programming for this feature is done during installation.

CENTRAL OFFICE CALL, INCOMING

3.05 Central Office Call - Incoming is a system programmable feature. Incoming calls can be answered from any extension programmed to receive calls. Incoming CO calls provide a distinctive tone signal at the extension.

CENTRAL OFFICE CALL, OUTGOING

3.06 Outside calls can be initiated from an extension provided that the extension's Class of Service (COS) does not restrict the outgoing call. This is a system programmable feature.

CONFERENCE

3.07 Conference Call is a permanent feature that permits a three-way telephone conversation. The CO Premises Extension cannot initiate conference calls, however, these telephones can be included in conference calls initiated by other key telephones.

DIRECTED CALL PICK UP

3.08 Directed Call Pick-Up is a permanent feature that permits a transferred CO call to be answered at an extension near the extension to which the call is being transferred. The call can be answered at the OPX telephone. If the call is unanswered, the automatic line ends the attendant.

GROUP PICK UP

3.09 Group Pick-Up is a permanent feature that permits a transferred CO call to be answered at an extension near the extension to which the call is being transferred. The call can be answered at the OPX telephone. If the call is unanswered, the automatic line ends the attendant.

Table 1 OPX SPECIFICATIONS

<p>OPX Capacity: Single line telephone as OPX 3 Maximum Line Loss - 1300 ohms</p>
<p>Tellabs 8102 Ringing Generator: Input voltage: 22 - 26VDC or 44 - 66VDC (switch selectable) Set switch to 48V position Input current at 48VDC: 75mA (no load) 250mA (full load) 48VDC is used with the OPX. Output: 85 - 135 VAC 5 Watts maximum Ring Equivalence: Up to 5 high impedance ringers simultaneously Fusing: Input to ringing generator - 1 amp slow-blow cartridge type - Bussman 3AG or equivalent Polarity: Floating output may be biased positively or negatively Dimensions and Weight: 3" W x 7" H x 7" D (18cm x 7cm x 18cm) 5lbs (3 kg) Operating Environment: 20 - 130° F (- 7 - 54° C), humidity - 95% non condensing Part number: 5W 8102</p>
<p>Power Supply: Tellabs 8001 Power Supply Input voltage range: 105 - 130VAC rms, 57 - 63Hz, single phase Output: 24 or 48VDC, switchable, 1 ampere maximum current. Set switch to 48V position Regulation: + 1.0 or - 1.0 volt, no load to full load, low line to high line Ripple: 2mV RMS typical, 5mV RMS maximum, measured at full load and low line voltage Output protection: Current - voltage foldback, activated at approximately 1.2 amperes output current Short circuit protection: Will tolerate output short circuit of any duration Polarity: Either positive or negative output terminal can be referenced to ground Fusing: Line fuse - 1.5 ampere Operating Environment: 20 - 20° F (- 7 - 49° C), no load to full load, low line to high line, humidity to 95% non condensing Dimensions and Weight: 3" W x 7" H x 7" D (18cm x 7cm x 18cm) Approximately 7 lbs Part Number: 1A-8001</p>
<p>KSUs: Dimensions: 6 Card KSU: 13" W x 16" H x 11" D (33cm x 41cm x 28cm) 13 Card KSU: 25" W x 16" H x 11" D (64cm x 41cm x 28cm) Part Numbers: 6 Card KSU - 501A00101 13 Card KSU - 512A00101</p>

Table 2 OPX FEATURES

FEATURE	TCX-128	EK-1648	EK-1232	EK-818
Account Code	X	X	X	X
Barge-In	X	-	X	X
Call Waiting	-	X	-	X
Central Office Call, Incoming	X	X	X	X
Central Office Call, Outgoing	X	X	X	X
Conference	X	X	X	X
Directed Call Pick-Up	X	-	X	-
Group Pick-Up	X	-	X	-
Hold	X	X	X	X
Intercom	X	X	X	X
Last Number Redial	X	X	X	X
Paging	X	X	X	X
Park	X	-	X	-
Speed Dial	X	X	X	X
Split	X	-	X	-
Toll Restriction	X	X	X	X
Transfer	X	X	X	X
Universal Night Answer	X	X	X	X

X: Indicates system has feature.
- Indicates system does not have feature.

HOLD

3.10 Hold is a permanent feature for placing a call in a temporary waiting condition. If the call is left on hold longer than the programmed period, the call will ring again at the extension.

INTERCOM

3.11 Intercom (ICM) is a system programmable feature. Intercom internal calls can be initiated from any extension in the system. If the extension being called is a key telephone, the called party can respond handsfree. If the called party has a 2500 type single line telephone, the handset must be lifted for response. On ICM calls from a single line telephone, the called extension will receive a distinctive ICM ring tone.

LAST NUMBER REDIAL

3.12 Last Number Redial is a system programmable feature available to extensions on a 2500 type telephone. The call transfer feature allows the last number dialed to be redialed. This is useful for dialing a number that is difficult to dial or for redialing a number that was dialed incorrectly. The last number redial feature is available on 2500 type telephones.

PAGING

3.13 Paging is a system programmable feature. There are two types of Paging: **All Call Paging** and **Zone Paging**.

All Call Paging

3.14 All Call Paging is broadcast over all extensions in the system, except those extensions programmed not to receive page announcements. All Call Paging may be initiated from any of the telephones in the system. Off-Premises Extensions cannot receive All Call Paging. Optional external amplifiers and speakers can also be connected to each zone for page broadcasts.

Zone Paging

3.15 Zone Paging provides paging to groups of extensions. Multi-button telephones may receive paging via the speed-dial phone. Off-Premises Extensions cannot receive Zone Paging, however, they can initiate Zone Page.

PARK

3.16 Park is a system programmable feature that allows a call to be transferred to a specific extension or to a group of extensions. There are two types of Park: **General Park** and **Personal Park**. **General Park** allows a call to be transferred to a specific extension or to a group of extensions. **Personal Park** allows a call to be transferred to a specific extension or to a group of extensions. The call is held in a queue until the called party answers.

General Park Orbit

3.17 General Park Orbit provides access to parked calls from any extension in the system - calls are retrieved from a General Park Orbit by dialing designated codes.

Personal Park Orbit

3.18 Personal Park Orbit provides access to calls that are parked at a particular extension. These calls can be answered at any other extension by dialing the extension number of the extension where the call is parked.

SPEED DIAL

3.19 Speed Dial is a programmable feature that permits automatic dialing of stored telephone numbers. There are two types of Speed Dial - System Speed Dial and Extension Speed Dial. Extension Class of Service and Toll Restriction programming can deny or limit Speed Dial for a particular extension.

3.20 Extensions can store frequently dialed numbers as Extension Speed Dial numbers. The attendant can store frequently dialed numbers as System Speed Dial numbers. System Speed Dial numbers are available to every extension in the system.

SPLIT

3.21 Split is a permanent feature that allows an extension user to place a call on hold and answer a second incoming call. Using the Split feature the user can alternate between the two calls. This feature may be accessed on all telephones used in the system.

TOLL RESTRICTION

3.22 Toll Restriction is a programmable feature that prohibits selected extensions from placing unauthorized long distance, toll, or local calls. Extensions can be restricted to internal calls, Speed Dial, or selected area codes depending on the Class of Service designated for that line and/or extension.

TRANSFER

3.23 Transfer is a permanent feature that transfers an established outside call to a different extension. Calls may be transferred (unscreened / unannounced) or (screened / announced). Transferred calls that are unanswered return to the attendant after a programmable period of time.

UNIVERSAL NIGHT ANSWER

3.24 The N. BATT. key on the Attendant Multi-button Keypad Telephone is used during off hours to put the system in the Universal Night Answer (UNA) mode. In this mode telephones and optional external page systems, so programmed during installation, can receive indications of incoming calls. The ability to put the system into the UNA mode is available at the attendant's extension only.

3.25 Off-Premises Extensions (2500 type) single line telephones can answer Night Ringing heard over the paging system. When more than one incoming CO line is ringing while the system is in the Universal Night Answer mode, these telephones will automatically access the first incoming call.

NOTE: The incoming CO lines which ringing at all extensions in the Universal Night Answer mode are programmed individually. This allows special lines, such as Direct Inward Lines (DILS) or Private Lines to ring only at selected extensions as they do when the system is in the normal daytime mode. These special lines will not ring over the paging circuit.

4. INSTALLATION

Preparation

4.01 The following paragraphs provide instructions for connecting the CPX to the system equipment. It is recommended that the 6 Card and 13 Card KSU be mounted on a separate mounting board to the left of the system equipment and near a separate 115VAC, 15 amp outlet (Figures 5a and b). The maximum line loss for the CPX is 1300 ohms.

4.02 Before proceeding with the installation, have the necessary hardware and cables available. This includes: exterior grade plywood backboard, 25-pair cable for rfcid connection, standard 4-conductor quad station cabling, grounding wire (14 AWG), connecting blocks (66M1-50 type with bridging clips), modular jack (625 A, 625 F or equivalent) and the appropriate mounting hardware.

Mount the 6 Card or 13 Card KSU as follows:

- Attach the plywood backboard in the designated location with the appropriate fasteners. Mark the equipment layout on the board using the installation layout drawing (Figure 5).
- Drill pilot holes at these points and insert suitable fasteners having a 1/4 inch shank diameter. Screw in fasteners until the clearance between the fastener head and the mounting surface is 1/4 inch.
- Mount the KSU on the four fasteners and tighten each fastener until the KSU is securely attached to the mounting surface.

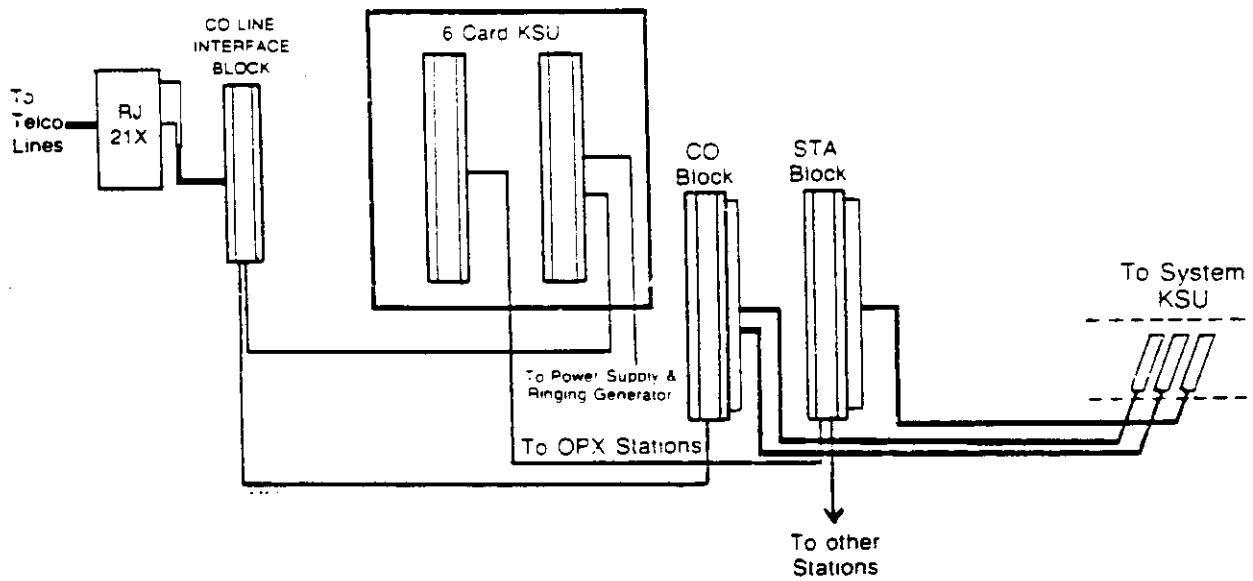


Figure 5a OPX INSTALLATION WITH 6 CARD KSU

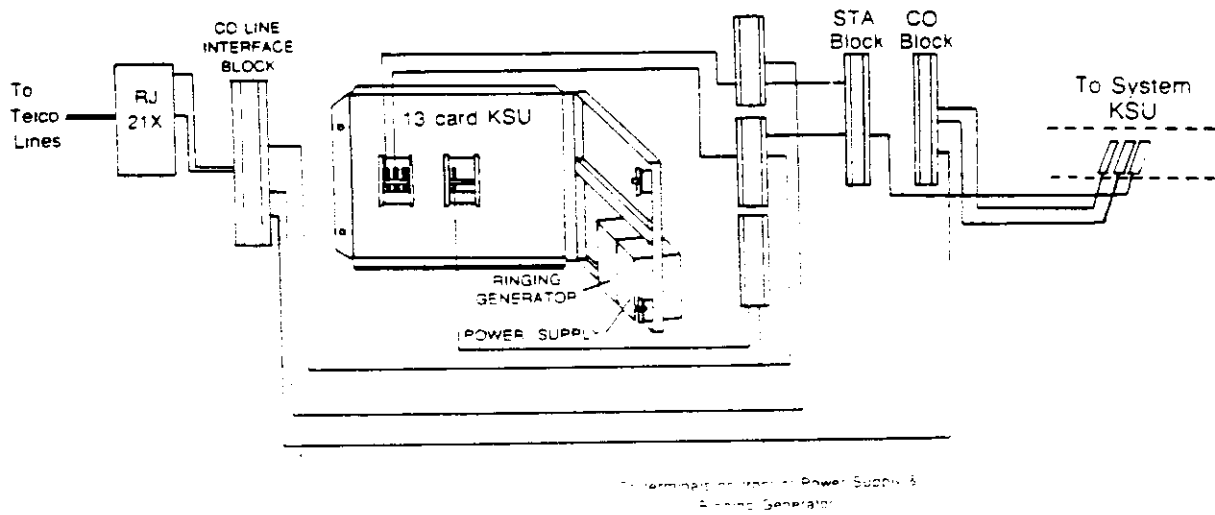


Figure 5b OPX INSTALLATION WITH 13 CARD KSU

4.03 The Power Supply and Ringing Generator are mounted on the Ringed Jack Mounted Card or 13 Card KSU (Figures 1 and 4). The Power Supply and Ringing Generator and a Jumper are mounted near the terminal board on a 13 Card KSU to facilitate cross connecting.

4.04 Mount three additional 66M1150 connecting blocks to the front of the system KSU when a 13 Card KSU is installed. These blocks are used to access the connections on the connectors P1, P2 and P4 located inside the 13 Card KSU. P1 and P2 provide access to system and teleco connections. P4 provides access to the Power Supply.

4.05 Check to ensure that the station plug (P3, P9) in the main system KSU or P3 to P9 in an expansion cabinet is used. Which corresponds to B-3SLU-B serving the OPX is connected to the appropriate station OPX block. Refer to Section 5, INSTALLATION of the System Description and Installation Manual.

NOTE: It is recommended that the B-3SLU-B serving the OPX be inserted in the system KSU slots J13, J12, J10, J9 or J8. This prevents having to cross connect to two station blocks to access the connections for the eight OPXs. The expansion cabinet, when applicable, can also be used. It is recommended that the B-3SLU-B be inserted into slot J16, J14, J13, J11, J10 or J9 of the expansion cabinet.

4.06 Ground the KSU and Power Supply by connecting a 14 AWG wire to the positive (+) terminal on the Power Supply and a cold water pipe ground (Figures 6, 7).

4.07 Connect the 6 Card or 13 Card KSU to the Power Supply and Ring Generator as follows (Figures 6, 7).

NOTE: Check to ensure the switches on both units are in the OFF position when cross connecting. Switches should be in the position labeled 48V when the system is operating.

To connect the 6 Card KSU to the Power Supply and Ringing Generator (Figure 6, Table 3)

- The AG connections for each OPX on block C must be jumpered (terminals 1, 3, 5, 7, 9 and 11) and connected to terminal 43, also on the C block.
- The AB connections for each OPX on block C must be jumpered (terminals 2, 4, 6, 8, 10 and 12) and connected to terminal 44, also on the C block.
- Connect terminal 44, designated as AB, from the C Block in the KSU to the -V screw terminal on the Ringing Generator.
- Connect terminal 48, designated as RB, from the C Block to the screw terminal labeled +/- 105 on the Ringing Generator.
- Connect terminal 43, designated AG on the C Block to the terminal labeled +V on the Ringing Generator.
- Jumper the -V terminal on the Ringing Generator to the COM terminal on the Ringing Generator.
- Connect the screw terminal labeled +V on the Ringing Generator to the + terminal on the Power Supply.
- Connect the COM terminal on the Ringing Generator to the negative (-) terminal on the Power Supply.

To connect the 13 Card KSU to the Power Supply and Ringing Generator (Figure 7, Table 4)

- Terminals 1, 4, 7, 10, 13, 16, 19 and 22, designated as GND on the P4 block must be jumpered together and cross connected to the GND terminal on the TB1 terminal board in the 13 Card KSU.
- Terminals 3, 5, 9, 12, 15, 18, 21 and 24, designated as -48V on the P4 block must be jumpered together and cross connected to the AB terminal on the TB1 terminal board in the 13 Card KSU.
- Connect the AB terminal on TB1 terminal board on the 13 Card KSU to the -V terminal on the Ringing Generator.
- Connect the RNG terminal to the +/- 105 terminal on the Ring Generator.
- Connect the GND terminal to the -V terminal on the Ring Generator.
- Jumper the -V terminal to the COM terminal on the Ring Generator.
- Connect the COM terminal on the Ringing Generator to the negative (-) terminal on the Power Supply.
- Connect the +V terminal on the Ringing Generator to the positive (+) terminal on the Power Supply.

Crossconnections to the 6 Card KSU

4.08 Connections from the B-3SLU-B are made on the A block (Figure 8 and Table 5). In the 6 Card KSU, use two pair wire to cross connect the appropriate SLU connector block to the A Block in the 6 Card KSU. For each OPX, cross connect clips 1-5 as follows:

- Cross connect the GRN wire from the AT lead on the station block to the T terminal of the A block in the 6 Card KSU.
- Cross connect the RED wire from the AR terminal on the station block to the R terminal of the A block.
- Cross connect the BLK wire from the BT terminal on the station block to the A terminal of the A block.
- Cross connect the YEL wire from the BR terminal on the station block to the L terminal on the A block.

NOTE: Clip 6 on block A contains connections for internal wiring and requires no additional connections.

Crossconnections to 13 Card KSU

4.09 Connections from the B-3SLU-B are made via connectors P1 and P2. Plug a 26 pair cable into P1, extensions 1-5 and P2, extensions 6-5, connectors and bunch down the free conductors according to standard telephone code on the two additional 66M1150 blocks to be designated as a P1 and P2 block. Use quad wire to cross connect the station OPX block to the P1 and P2 block (Tables 6, 7).

- Cross connect the GRN lead to AR terminal on the station block to terminal 13 on the P1 Block.
- Cross connect the RED lead to AT terminal on the station block to terminal 4 on the P1 Block.
- Cross connect the YEL lead to BT terminal on the station block to terminal 9 on the P1 Plug.
- Cross connect the BLK lead to BR terminal on the station block to terminal 25 on the P1 Plug.

NOTE: P2 requires no additional connections.

4.10 Repeat the procedure just described for each OPX.

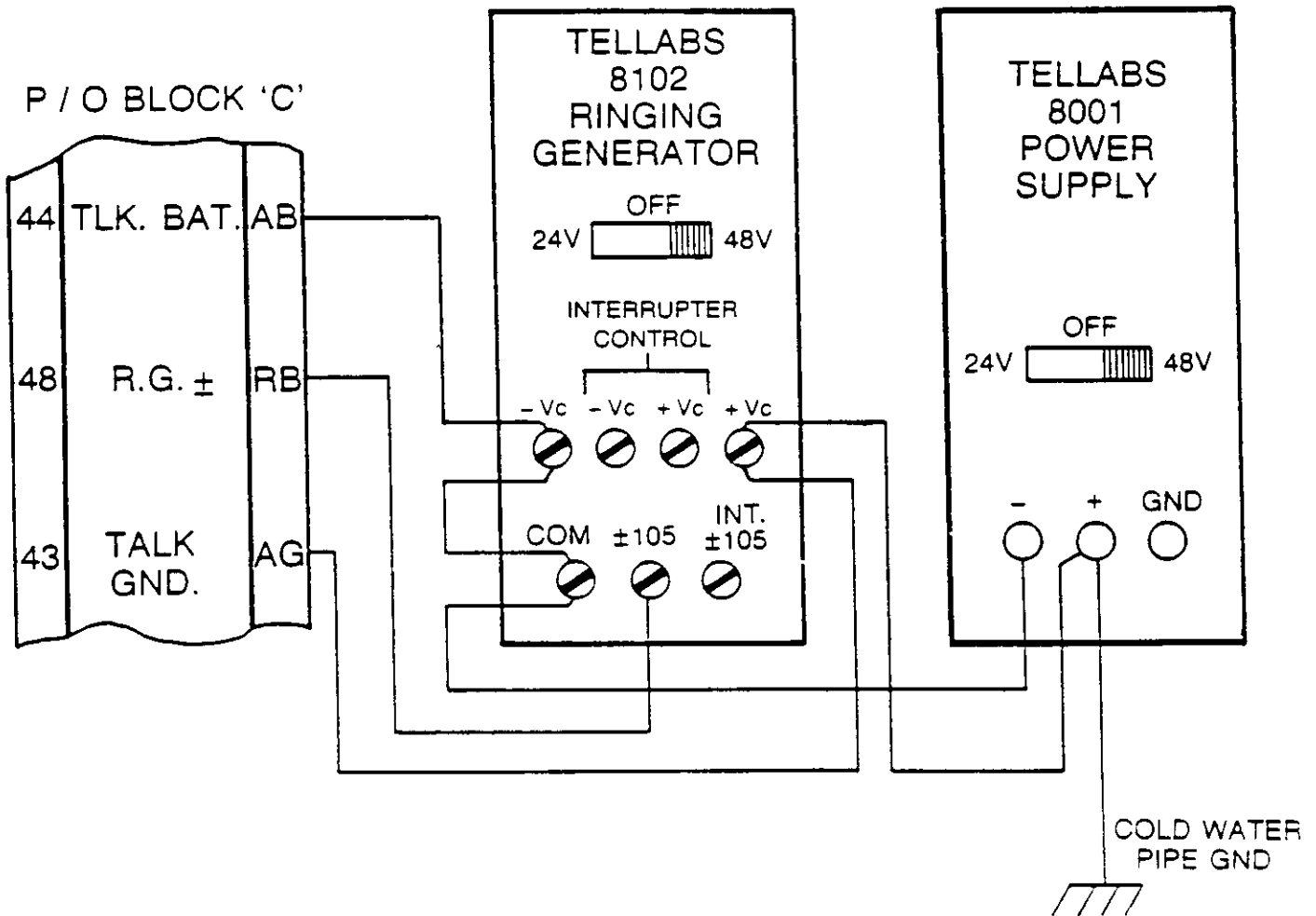


Figure 6 CONNECTING 6 CARD KSU TO POWER SUPPLY AND RINGING GENERATOR

Table 3 6 CARD KSU B / C BLOCK CONNECTIONS

BLOCK B					BLOCK C			
FEATURE	LEAD DESIG.	TERMINAL NUMBER	CLIP			TERMINAL NUMBER	LEAD DESIG.	FEATURE
			1	2	3			
	B 1	1	.	.	.	1	AG	
	B 2	2	.	.	.	2	AB	LINE 1
	B 3	3	.	.	.	3	AG	
	B 4	4	.	.	.	4	AB	LINE 2
	B 5	5	.	.	.	5	AG	
	B 6	6	.	.	.	6	AB	LINE 3
	B 7	7	.	.	.	7	AG	
	B 8	8	.	.	.	8	AB	LINE 4
	B 9	9	.	.	.	9	AG	
	B 10	10	.	.	.	10	AB	LINE 5
	B 11	11	.	.	.	11	AG	
	B 12	12	.	.	.	12	AB	LINE 6
	B 13	13	.	.	.	13		
	B 14	14	.	.	.	14		
	B 15	15	.	.	.	15		
	B 16	16	.	.	.	16		
	B 17	17	.	.	.	17	BZ	
	B 18	18	.	.	.	18	BZ1	
LINE 1	B1 BZ1	19	.	.	.	19	RN	
	R1 BZ	20	.	.	.	20	ST	
LINE 2	B1 BZ1	21	.	.	.	21	LF1	
	R1 BZ	22	.	.	.	22	LW1	
LINE 3	B1 BZ1	23	.	.	.	23	LF2	
	R1 BZ	24	.	.	.	24	LW2	
LINE 4	B1 BZ1	25	.	.	.	25	T	LINE 1
	R1 BZ	26	.	.	.	26	R	
LINE 5	B1 BZ1	27	.	.	.	27	T	LINE 2
	R1 BZ	28	.	.	.	28	R	
LINE 6	B1 BZ1	29	.	.	.	29	T	LINE 3
	R1 BZ	30	.	.	.	30	R	
	CAS	31	.	.	.	31	T	LINE 4
	CAS	32	.	.	.	32	R	
	CAS	33	.	.	.	33	T	LINE 5
	CAS	34	.	.	.	34	R	
	CAS	35	.	.	.	35	T	LINE 6
	CAS	36	.	.	.	36	R	
		37	.	.	.	37	LG1	LP GND
		38	.	.	.	38	LB1	LP BAT
		39	.	.	.	39	LG2	LP GND
		40	.	.	.	40	LG2	LP BAT
		41	.	.	.	41	BG	RLY GND
		42	.	.	.	42	BR	RLY BAT
		43	.	.	.	43	AG	TLK GND
		44	.	.	.	44	AB	TLK BAT
		45	.	.	.	45	BG	RLY GND
		46	.	.	.	46		
		47	.	.	.	47	RG	RG GND
		48	.	.	.	48	RB	RG
		49	.	.	.	49	RG	BZ GND
		50	.	.	.	50	RB	BZ

* Connect to clips as required.

** Pre-wiring is terminated on this clip, no additional wiring is required

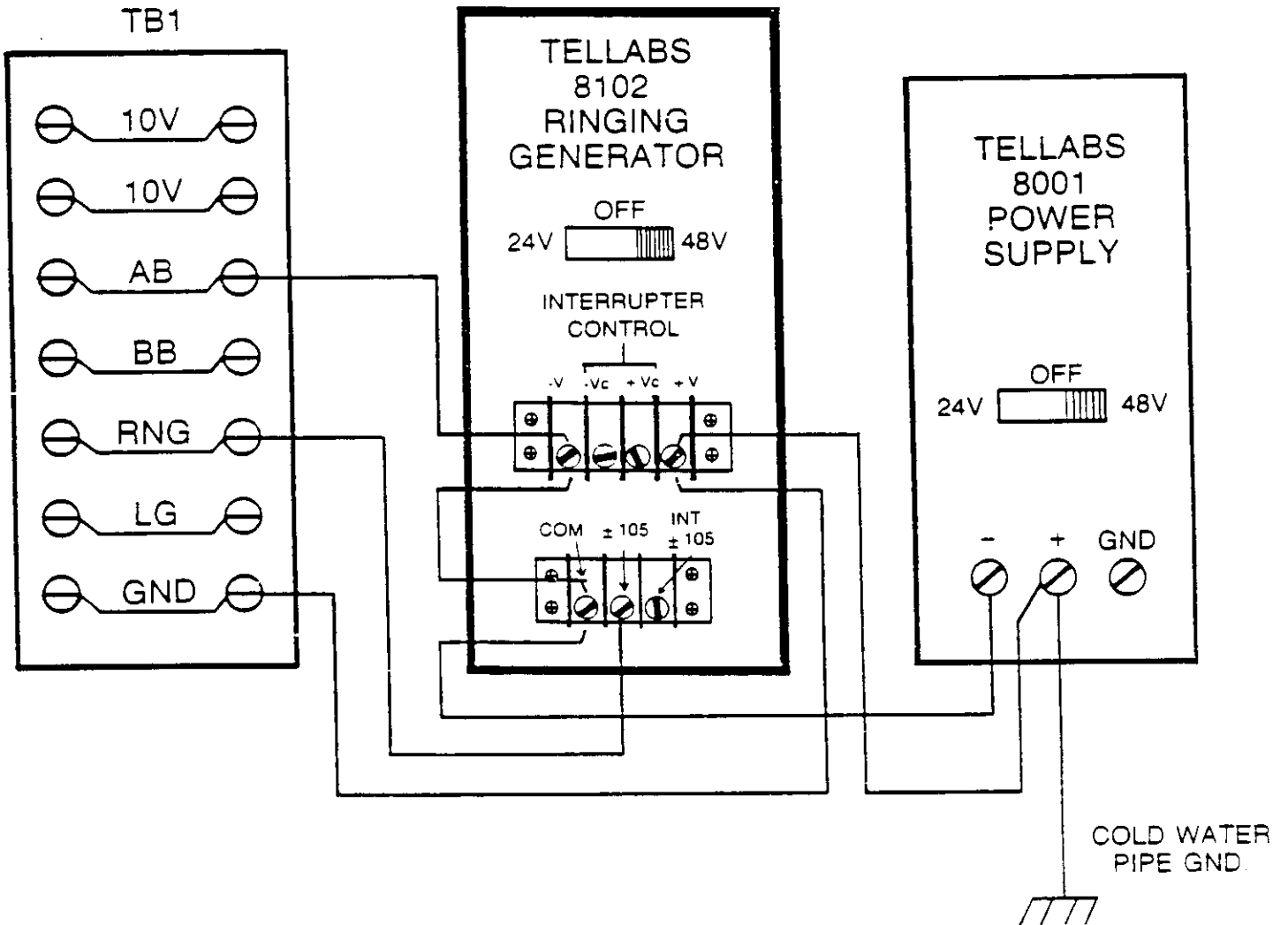


Figure 7 CONNECTING 13 CARD KSU TO POWER SUPPLY AND RINGING GENERATOR

Table 4 13 CARD KSU P4 CONNECTIONS

25 Pair Cable		P4 Connector	
Conn. Pair	Color Code	Block Term.	Function
26	WHT-BLU	1	GND
27	BLU-WHT	2	
27	WHT-ORN	3	48 V ⁺
28	ORN-WHT	4	GND
28	WHT-BRN	5	
29	BRN-WHT	6	48 V ⁺
29	WHT-BRN	7	GND
30	BRN-WHT	8	
30	WHT-SLT	9	48 V ⁺
31	SLT-WHT	10	GND
31	RED-BLU	11	
32	BLU-RED	12	48 V ⁺
32	RED-ORN	13	GND
33	ORN-RED	14	
33	RED-GRN	15	48 V ⁺
34	GRN-RED	16	GND
34	RED-BRN	17	
35	BRN-RED	18	48 V ⁺
35	RED-SLT	19	GND
36	SLT-RED	20	
36	BLK-BLU	21	48 V ⁺
37	BLU-BLK	22	GND
37	BLK-ORN	23	
38	ORN-BLK	24	48 V ⁺
38	BLK-GRN	25	
39	GRN-BLK	26	
39	BLK-BRN	27	
40	BRN-BLK	28	
40	BLK-SLT	29	
41	SLT-BLK	30	
41	YEL-BLU	31	
42	BLU-YEL	32	
42	YEL-ORN	33	
43	ORN-YEL	34	
43	YEL-GRN	35	
44	GRN-YEL	36	
44	YEL-BRN	37	
45	BRN-YEL	38	
45	YEL-SLT	39	
46	SLT-YEL	40	
46	W/O BLU	41	
47	BLU-W/O	42	
47	W/O ORN	43	
48	ORN-W/O	44	
48	W/O GRN	45	
49	GRN-W/O	46	
49	W/O BRN	47	
50	BRN-W/O	48	
50	W/O SLT	49	
51	SLT-W/O	50	

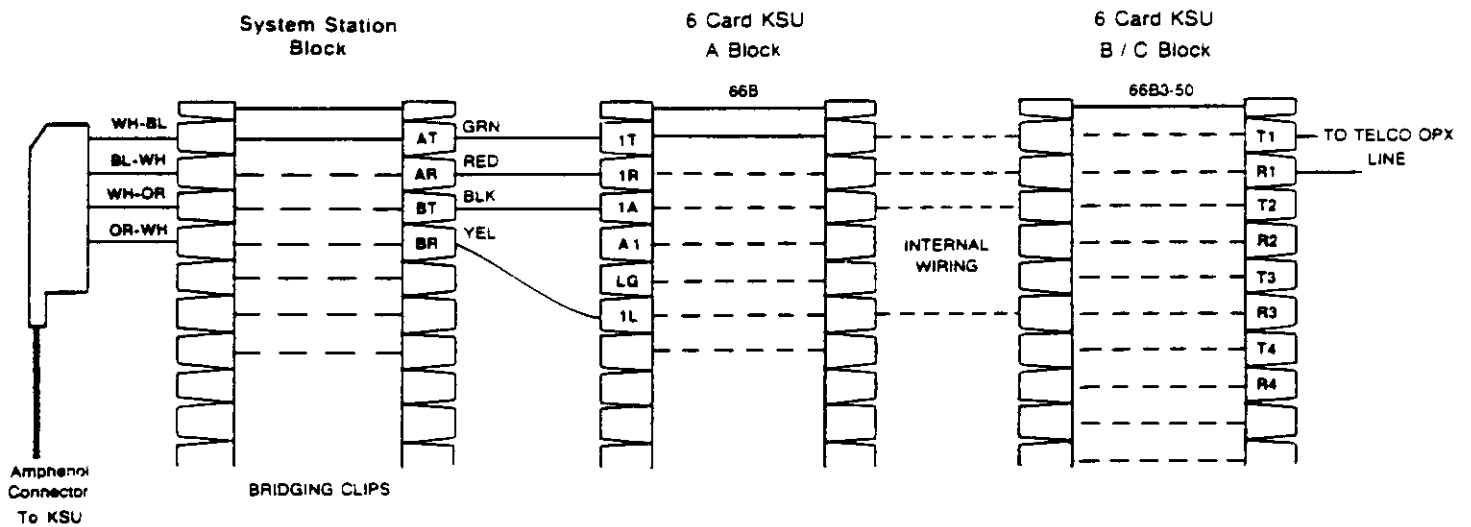


Figure 8 6 CARD KSU CROSSCONNECTIONS

Table 5 6 CARD KSU A BLOCK CONNECTIONS

BLOCK A									
OPX NUMBER FROM SLU BLOCK	STATION CABLE	LEAD DESIGNATION	TERMINAL NUMBER	CL.P					
				1	2	3	4	5	6
STA. 1	GREEN	-	-						
	RED	S	2						
	BLACK	A	3						
		A1	4						
	YELLOW	LG	5						
-		-	6						
STA. 2	GREEN	T	7						
	RED	R	8						
	BLACK	A	9						
		A1	10						
	YELLOW	LG	11						
L		12							
STA. 3	GREEN	T	13						
	RED	R	14						
	BLACK	A	15						
		A1	16						
	YELLOW	LG	17						
L		18							
STA. 4	GREEN	T	19						
	RED	R	20						
	BLACK	A	21						
		A1	22						
	YELLOW	LG	23						
L		24							
STA. 5	GREEN	T	25						
	RED	R	26						
	BLACK	A	27						
		A1	28						
	YELLOW	LG	29						
L		30							
STA. 6	GREEN	T	31						
	RED	R	32						
	BLACK	A	33						
		A1	34						
	YELLOW	LG	35						
L		36							
N/A		T	37						
		R	38						
		T	39						
		R	40						
		LG	41						
N/A		L	42						
		LG	43						
		L	44						
		B	45						
		R	46						
N/A		B	47						
		R	48						
		B	49						
		R	50						

* Connect to clips as required

** Pre-wiring is terminated on this strip, no additional wiring is required

Table 6 13 CARD KSU P1 CONNECTIONS

25 Pair Cable		P1 Connector		Station Cable	Interconnect
Conn. Pin	Color Code	Block Term.	Function	To Station Block	To Trunk Interface
26	WHT-BLU	OPX 1	OPX 1T	GRN RED BLK YEL	WHT-BLU BLU-WHT
27	BLU-WHT		OPX 1R		
28	WHT-ORN		OX 1T		
29	ORN-WHT		OX 1R		
30	WHT-GRN		OX 2T		
31	GRN-WHT		OX 2R		
32	WHT-BRN		OX 3T		
33	BRN-WHT		OX 3R		
34	WHT-SLT		OX 4T		
35	SLT-WHT		OX 4R		
36	RED-BLU	OPX 2	OPX 2T	GRN RED BLK YEL	WHT-BLU BLU-WHT
37	BLU-RED		OPX 2R		
38	RED-ORN		OX 2T		
39	ORN-RED		OX 2R		
40	RED-GRN		OX 3T		
41	GRN-RED		OX 3R		
42	RED-BRN		OX 4T		
43	BRN-RED		OX 4R		
44	RED-SLT		OX 5T		
45	SLT-RED		OX 5R		
46	BLK-BLU	OPX 3	OPX 3T	GRN RED BLK YEL	WHT-BLU BLU-WHT
47	BLU-BLK		OPX 3R		
48	BLU-ORN		OX 3T		
49	ORN-BLU		OX 3R		
50	BLK-GRN		OX 4T		
51	GRN-BLK		OX 4R		
52	BLU-BRN		OX 5T		
53	BRN-BLU		OX 5R		
54	BLK-SLT		OX 6T		
55	SLT-BLK		OX 6R		
56	YEL-BLU	OPX 4	OPX 4T	GRN RED BLK YEL	WHT-BLU BLU-WHT
57	BLU-YEL		OPX 4R		
58	YEL-ORN		OX 4T		
59	ORN-YEL		OX 4R		
60	YEL-GRN		OX 5T		
61	GRN-YEL		OX 5R		
62	YEL-BRN		OX 6T		
63	BRN-YEL		OX 6R		
64	YEL-SLT		OX 7T		
65	SLT-YEL		OX 7R		
66	BLU-BLU	OPX 5	OPX 5T	GRN RED BLK YEL	WHT-BLU BLU-WHT
67	BLU-BLU		OPX 5R		
68	BLU-ORN		OX 5T		
69	ORN-BLU		OX 5R		
70	BLU-GRN		OX 6T		
71	GRN-BLU		OX 6R		
72	BLU-BRN		OX 7T		
73	BRN-BLU		OX 7R		
74	BLU-SLT		OX 8T		
75	SLT-BLU		OX 8R		

Table 7 13 CARD KSU P2 CONNECTIONS

25 Pair Cable		P2 Connector		Station Cable	Interconnect
Conn. Pin	Cable Code	Block Term	Function	To Station Block	To Trunk Interface
26	WHT-BLU	1	OPX 6T		WHT-BLU
27	BLU-WHT	2	OPX 6R		BLU-WHT
28	WHT-ORN	3	CX T	ORN	
29	ORN-WHT	4	CX R	RED	
30	WHT-GRN	5	CX+	BLK	
31	GRN-WHT	6			
32	WHT-BRN	7			
33	BRN-WHT	8	CX+	YEL	
34	WHT-SLT	9			
35	SLT-WHT	10			
36	RED-BLU	11	OPX 7T		WHT-BLU
37	BLU-RED	12	OPX 7R		BLU-WHT
38	RED-ORN	13	CX T	ORN	
39	ORN-RED	14	CX R	RED	
40	RED-GRN	15	CX+	BLK	
41	GRN-RED	16			
42	RED-BRN	17			
43	BRN-RED	18	CX+	YEL	
44	RED-SLT	19			
45	SLT-RED	20			
46	BLK-BLU	21	OPX 8T		WHT-BLU
47	BLU-BLK	22	OPX 8R		BLU-WHT
48	BLK-ORN	23	CX T	ORN	
49	ORN-BLK	24	CX R	RED	
50	BLK-GRN	25	CX+	BLK	
51	GRN-BLK	26			
52	BLK-BRN	27			
53	BRN-BLK	28	CX+	YEL	
54	BLK-SLT	29			
55	SLT-BLK	30			
56	YEL-BLU	31			
57	BLU-YEL	32			
58	YEL-ORN	33			
59	ORN-YEL	34			
60	YEL-GRN	35			
61	GRN-YEL	36			
62	YEL-BRN	37			
63	BRN-YEL	38			
64	YEL-SLT	39			
65	SLT-YEL	40			
66	VIO-BLU	41			
67	BLU-VIO	42			
68	VIO-ORN	43			
69	ORN-VIO	44			
70	VIO-GRN	45			
71	GRN-VIO	46			
72	VIO-BRN	47			
73	BRN-VIO	48			
74	VIO-SLT	49			
75	SLT-VIO	50			

* Provides POWER CONTROL signals to the P2 connector.

PCB Strapping

4.11 One B-8SLU-B PCB is required to serve the maximum of eight extensions. The PCB must be strapped in the 213 position to indicate that single line telephones are used (Figure 9). The SLU PCB can be inserted in any station position in the main or expansion cabinet (if used). However, it is recommended that the PCB be inserted in a position where one 25-pair cable out of the KSU serves all 8 station ports. This prevents cross connecting two station blocks to access the 8 OPXs.

4.12 The B-OPX-A PCB serves one On-Premises extension. It must be strapped for the desired ring mode. Strap E1 and E2 to provide the Normal ring mode (1 second on, 3 seconds off). Strap E2 and E3 to provide the Extend ring mode (2 seconds on, 2 seconds off). Figure 10. An OPX with a longer loop may require the Extend strapping to ensure proper ring detection.

Connections to Telco

4.13 Each OPX requires one OPX line. Access to OPX lines are provided on the RJ21X connecting block with CO lines. The OPX line is designated as 11M. Plug a female ended 25-pair cable into the telco RJ21X. Punch down tree connectors into a 66M1-50 connecting block to be designated as CO Line Interface Block.

Connect the 6 Card KSU to the OPX lines as follows: Table 3.

- *Cross connect terminals 25-36 in the C Block, depending on the number of OPX lines required, to the terminals for the OPX lines on the CO Line Interface Block.*

Connect the 13 Card KSU depending on the number of OPX lines required as follows: Tables 6-7.

- *Cross connect terminals 1 and 2 for OPX line 1; 11 and 12 for OPX line 2; terminals 21 and 22 for OPX line 3; terminals 31 and 32 for OPX line 4; and terminals 41 and 42 for OPX line 5 on the P1 Block to the CO Line Interface Block.*
- *Cross connect terminals 1 and 2 for OPX line 6; terminals 11 and 12 for OPX line 7; and terminals 21 and 22 for OPX line 8 on P2 Block to the CO Line Interface Block.*

On Premises Extension

4.14 The same installation procedures are used when connecting an On-Premises Extension OPX. The telephone used as an OPX is connected to the terminals on the C block or P1 and P2 block that are normally connected to the CO Line Interface Block.

5. CIRCUIT DESCRIPTION

General

5.01 An on-card voltage regulator provides 12 volts DC to power all logic circuits. OPX Tip and OPX Ring are protected by metal-oxide varistors (MOVs) against possible lightning strikes.

Refer to Figure 11 for electrical connections to OPX adaptor.

5.02 Ring Equivalence Number (REN) considerations when connecting on-premise stations are provided in Figure 12.

Figure 12 shows the relationship between the ring enable signals found on one SLU card. The ring equivalence number (REN) of the station pairs shown (1 and 2, 3 and 4, 5 and 6, 7 and 8) must not exceed 50B when both stations in each pair be addressed to ring at the same time.

Call Originating

5.03 When the OPX station connected to the adaptor is signaled by the system, the Ring Detect Circuit senses the change in DC voltage from 24VDC to 9VDC on the SLU Tip lead referenced to SLU BLK and generates a Ring Enable signal. The Ring Relay Drive Circuit uses this Enable signal to turn on the Ring Relay (RR). This relay applies GND to OPX Tip and ringing generator (90VAC @ 20Hz) to OPX Ring. A strap option is provided for 2 modes of ringing: Normal (1 second on, 3 seconds off) or Extend (2 seconds on, 2 seconds off). This option is provided because 1 second may not be long enough for reliable ring detection by remote equipment on long loops. The ringing generator must be biased to 48 volts DC. When the called party goes off hook, a DC current is generated. The Ring Trip Circuit senses this current and generates a Reset signal which shuts off the ring relay. The talk path is now established.

Call Answering

5.04 When the OPX station goes off hook, a DC current of at least 20mA flows through the battery feed coil (T1) and the wire resistors (Figure 13). This current is detected by the Loop Current Detector. This detector closes a DC path across SLU Tip and SLU Ring. Current flows through this path and an off hook condition is detected on the SLU card. System DM dial tone is heard at the OPX station.

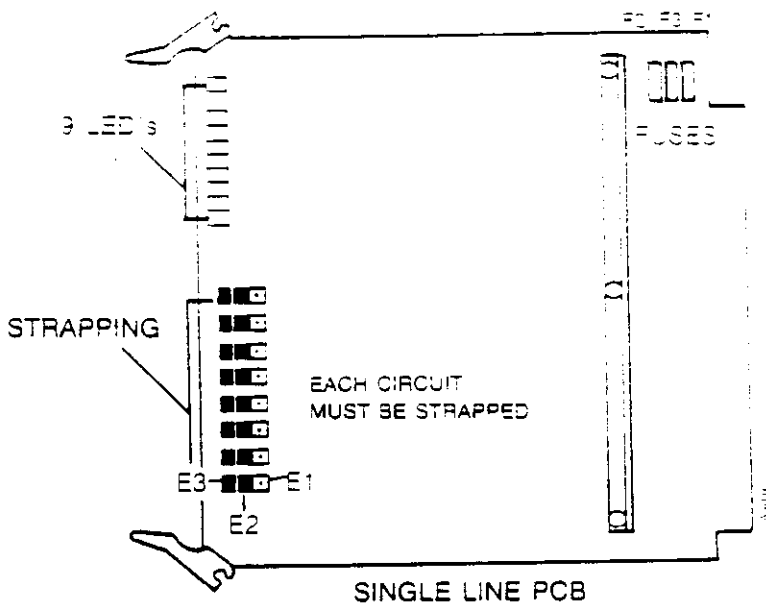


Figure 9 B-8SLU-B PCB

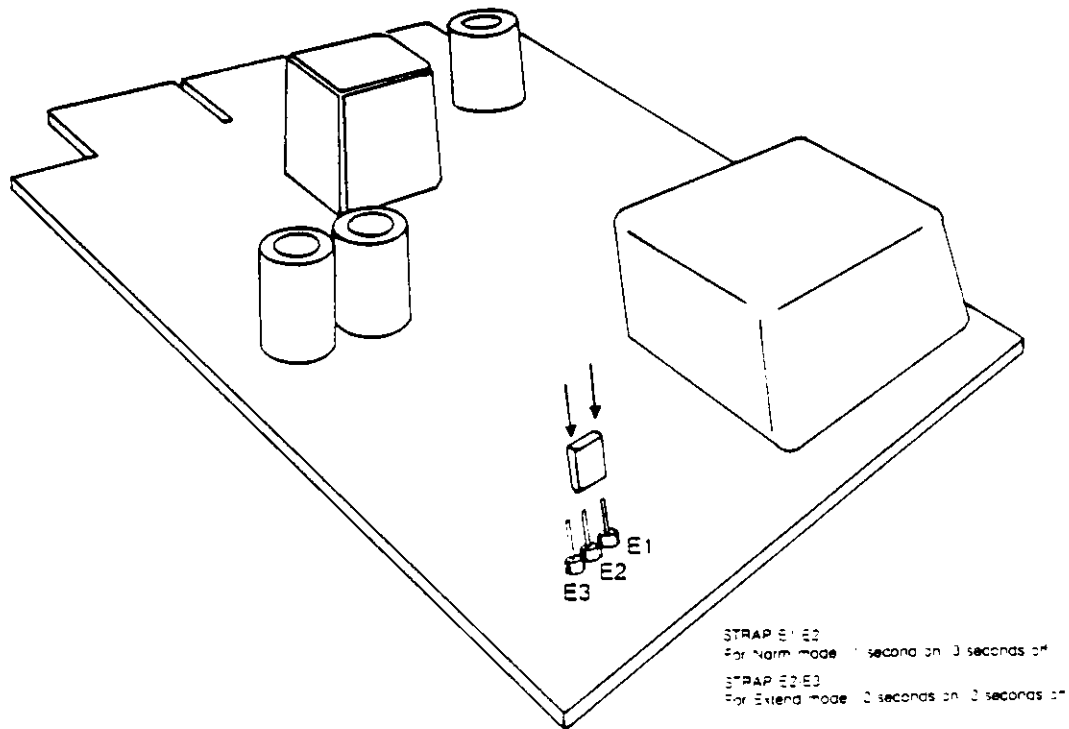


Figure 10 B-OPX-A PCB WITH STRAP OPTIONS

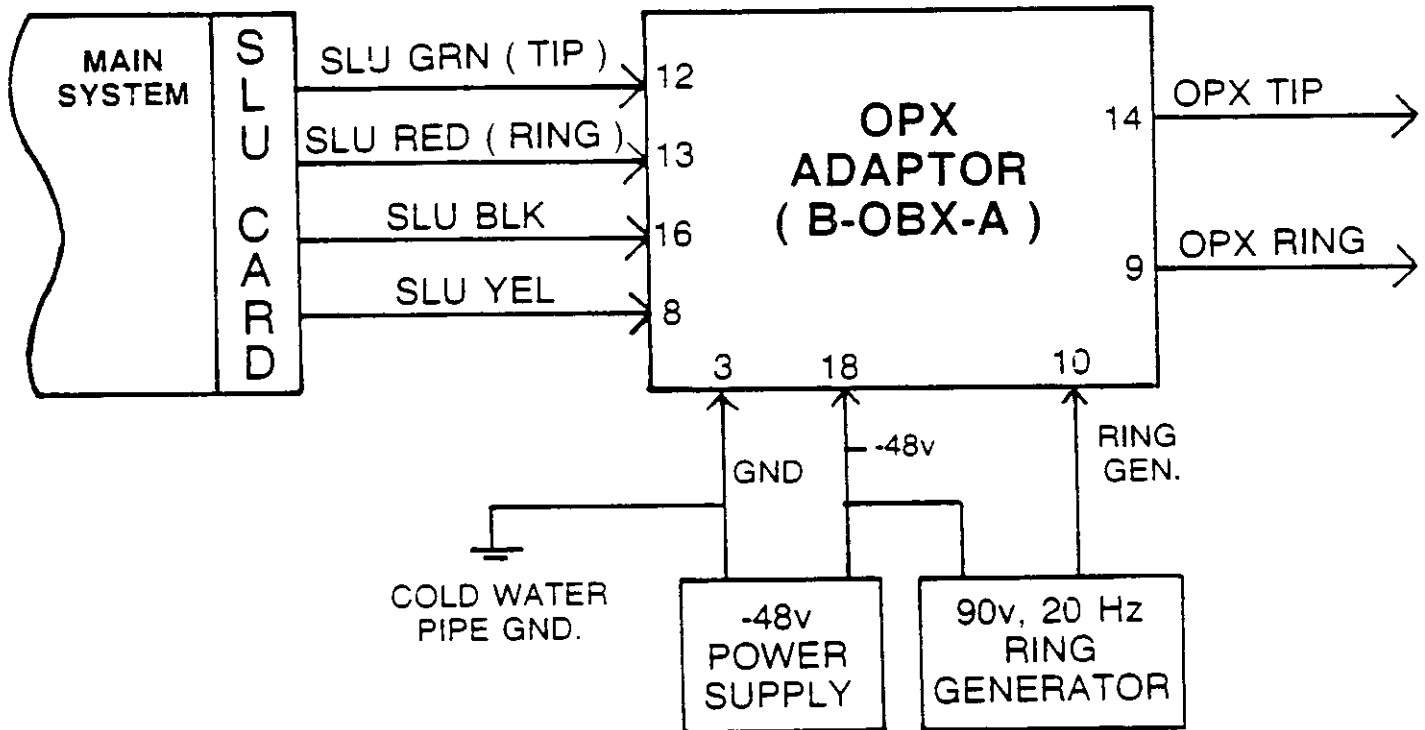


Figure 11 ELECTRICAL CONNECTIONS TO B-OPX-A PCB

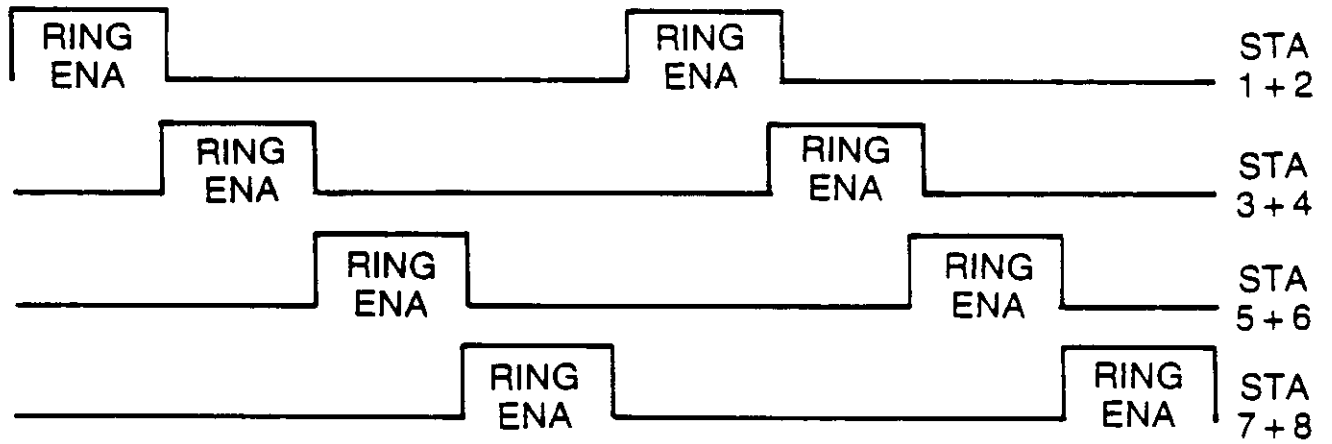


Figure 12 B-8SLU-B RING ENABLE CYCLES

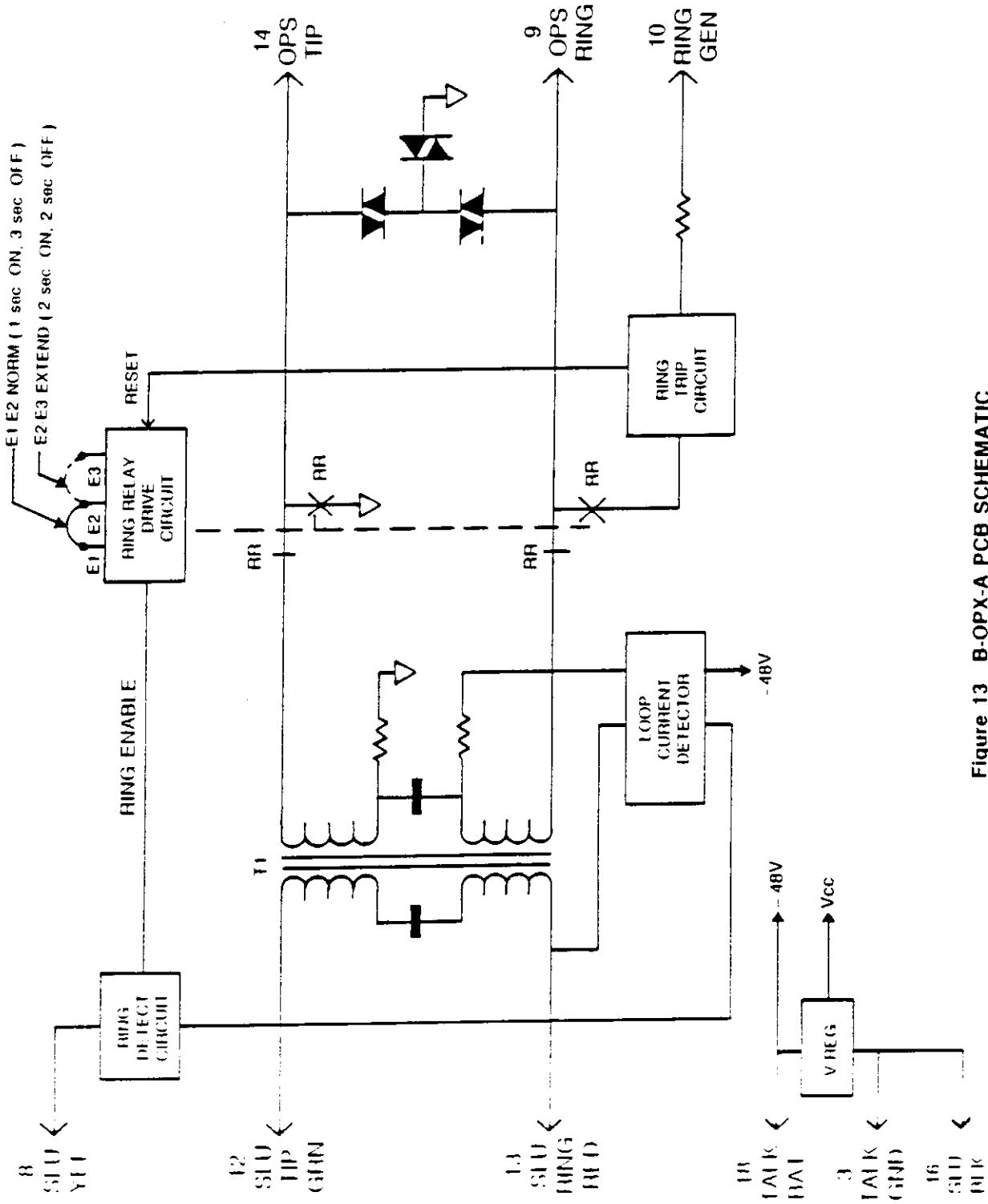


Figure 13 B-OPX-A PCB SCHEMATIC

TECHNICAL ASSISTANCE

When problems or questions arise during installation or servicing that cannot be resolved using this or related documents, contact TIE Technical Service Department as follows:

For assistance between 8:30 AM and 5:00 PM, Eastern time, call:

(203) 926-2033

For assistance in the event of an **ABSOLUTE** emergency at other times than those listed, call:

(203) 929-7920

